

TROPICAL DISEASES BULLETIN

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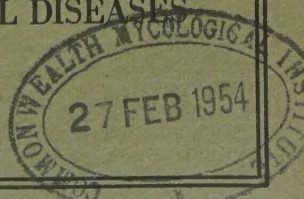
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BUREAU OF HYGIENE AND TROPICAL DISEASES

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SUMMARY OF RECENT ABSTRACTS *

II. YELLOW FEVER †

General

The World Health Organization (p. 210) in 1952 issued two maps delineating the endemic yellow fever areas of the world. The letterpress accompanying the maps gives details of the areas concerned, and is reproduced in full. A group of 5 maps of the world distribution of yellow fever has been prepared by MAY (p. 174) and issued on a single sheet. The maps show also the distribution of some of the vectors, and contain historical material.

Epidemiology: Animal Hosts: Transmission

Ross *et al.* (p. 618) describe, and discuss, a fatal case of yellow fever which occurred in a European in Uganda; this was only the fourth death from this disease to have been recorded in East Africa. The patient was presumably infected at his camp, and investigation revealed protective antibodies in the sera of children of that area. The patient had been vaccinated against yellow fever in England rather more than 4 years earlier, but vaccinations performed at that time often failed to lead to lasting immunity.

In a survey carried out in Kenya, HADDOW (p. 106) found neutralizing antibodies in a considerably higher proportion of galagos (bush babies) than monkeys, which suggests that galagos, and not monkeys, may be the chief mammalian hosts of the virus. It also suggests that it is unlikely that mosquitoes can play a major part in transmission because galagos are active after dusk and their sleeping habits in the daytime protect them considerably from mosquito bites. Commenting on this paper, Dick makes the point that the galago sera may possibly contain a non-specific neutralizing substance, or an antibody to an immunologically related virus; further studies are needed.

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1953, v. 50. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on yellow fever in this series see the February issues of the *Tropical Diseases Bulletin* each year since 1939.

LUMSDEN and VAN SOMEREN (p. 858) discuss the possibility that *Culex univittatus* var. *neavei* may be concerned in the maintenance of yellow fever virus in the wild monkeys of part of Uganda.

LEWIS (p. 858) describes the distribution of the *Aedes* (*Stegomyia*) mosquitoes of the Sudan, and discusses their relationship to yellow fever.

ELTON (p. 402) traces the progress of the wave of jungle yellow fever which in recent years has travelled from Panama to Costa Rica and Nicaragua, whence it will probably move to Honduras, Guatemala and Mexico. The epizootic moves at about 13 miles per month and takes 2 months to pass a given point, burning itself out and not doubling back. Epidemics in man tend to occur in the wet season, but do not affect towns where *Aedes* control has been carried out.

As part of the arrangements for study of the jungle yellow fever outbreak in Panama, mosquito stations were set up for purposes of survey. CARPENTER *et al.* (p. 211) show that certain species of *Haemagogus* were abundant, and that *Aedes leucocelaenus* was also present. Members of the genus *Sabethes* are regarded with suspicion, as they seem to be the only diurnal, canopy-feeding mosquitoes remaining in the dry season when *Haemagogus* and *Aedes* adults have disappeared. DE RODANICHE (p. 302) has made a survey of forest animals captured alive in this area, and has found positive protection tests with sera from 12 of 209 monkeys and from 2 agoutis and 1 pygmy anteater. She does not attempt to interpret the results of the tests on non-primates until further work has been done.

ELTON (p. 402) has made certain proposals for controlling this epizootic by establishing a barrier at a suitable point where natural barriers will reduce its width. Here he proposes systematic extermination of arboreal mammals and the widespread use of DDT against the forest mosquitoes, to be preceded by studies of their bionomics.

GAST GALVIS (p. 805) writes of the epidemiology of yellow fever in Colombia, where the disease occurs in rural areas. Viscerotomy indicates that males are more often affected than females, and no doubt the closer contact of men with work in forests accounts for this; in the woods *Haemagogus spegazzinii falco* abounds. Prevalence seems to run in cycles of 4-6 years and the foci are in the mountainous areas. In Colombia the larvae of *Haemagogus spegazzinii falco* are found only scantily in tree-holes in forests where adults (anomalously) are plentiful, but they are readily found at ground level in water-filled holes of fallen trees and stumps in places where man has felled trees or cut bamboo, and where human blood is readily available. KOMP (p. 211) points out the significance of this observation in relation to yellow fever.

LEVI-CASTILLO (p. 807) reports an outbreak of yellow fever in Ecuador in 1951, which affected mostly lumbermen and people working in the woods. An epizootic of jungle yellow fever was recorded in monkeys of the area, and the vector was *Haemagogus spegazzinii*.

BEVIER *et al.* (p. 926) trace the history of yellow fever in Bolivia, mentioning epidemics in the 19th century and the severe epidemic of 5,000 cases in Santa Cruz in 1932 which led to a campaign to eliminate *Aedes aegypti*. Since then there have been outbreaks of jungle yellow fever, sometimes affecting 200 people or more, but in 1949 and 1950 an entirely new situation developed, with 1,773 known cases in 1950, widely distributed. It seems that *Haemagogus* mosquitoes left their usual habitat in the forest canopy to become house pests, breeding in domestic receptacles, and the epidemic had the character previously associated with transmission by *Aedes aegypti*.

Immunization

Tests made in Nigeria of the dried 17D vaccine kept at 0°-4°C. for 5-7 years showed only slight decline in potency. HAHN and BUGHER (p. 807) make the point that in such tests the separate ampoules should be titrated individually in order to detect any having low titre (resulting from error in technique) which might be masked if several ampoules are pooled. Reasons are given for allowing a standard time of 20 minutes between rehydration and titration.

In a comparison of two groups, each of 25 Africans, DICK and HORGAN (p. 403) found better response to 17D vaccine when it was injected subcutaneously and followed by smallpox vaccine by scarification, than when the two vaccines were administered together by scarification.

DICK and GEE (p. 24) in Uganda made a survey of the immune state of 202 persons, some of whom had been immunized against yellow fever from 9 years before. They found that 77.2 per cent. of those immunized 9 years earlier remained immune, and they suggest that the validity of yellow fever certificates could be extended up to at least 9 years after vaccination, except in the case of children who were under 7 years when vaccinated.

From Nigeria MACNAMARA (p. 808) reports reactions which followed the use of the Dakar neurotropic vaccine by scarification, in an area where yellow fever had broken out. The reactions were classified as mild (with slight fever a few days after vaccination) or viscerotropic (with jaundice, vomiting and albuminuria—some of these cases may have been natural yellow fever infections) or neurotropic (with encephalitis). The incidence of neurotropic complications was 3-4 per 1,000 in children, with a case-mortality rate of 40 per cent.; adults were also affected, but less frequently. The incubation period was 9 days to over 3 weeks. Virus, shown to be that of the vaccine, was isolated from 3 of 4 brains on which tests were made at autopsy. The use of this vaccine has been suspended in Nigeria.

KOUWENAAR (p. 928) reviews the causes of reaction to subcutaneous injections of 17D vaccine, which may be the multiplication of the virus, or a general non-specific reaction to protein, or specific allergy. He reports these reactions in a group of vaccinated persons, and concludes that the risk of allergic reaction will only be overcome when the scarification method is used in place of subcutaneous injection.

Control

In an account of the control of malaria and yellow fever in French Guiana FLOCH (p. 9) shows that after the use of residual insecticides for several years *Aedes aegypti* has disappeared from the urban areas. GARCÍA SOLÓRZANO (pp. 925, 926) comments on the *Aedes* eradication programme carried out in recent years in Ecuador by means of DDT, with considerable success. Several viscerotomy specimens positive for yellow fever were reported in 1951. NEGhme *et al.* (p. 927) describe the campaign for eradication of *Aedes aegypti* in Chile, in which DDT is introduced into village water tanks to a concentration of 1 part per million for 3 days (repeated periodically) for the control of breeding. This has eradicated *Aedes aegypti* from most of the country, but is less effective than imagocidal work in areas where hidden breeding places may remain for long periods.

Charles Wilcocks

MALARIA

CROCKETT, G. S. & SIMPSON, K. **Malaria in Neighbouring Londoners.**
Brit. Med. J. 1953, Nov. 21, 1141.

The authors report the occurrence in May and June 1953, of benign tertian malaria in 2 persons—an adult woman and an 8-year-old boy—living in adjacent semi-detached houses in Stockwell, London. The adult patient had visited Nice in 1952 but it is believed that malaria is not endemic there; the boy had not been out of London for 2 years. The various possible modes of infection are discussed. It is considered probable that both patients received their infections from the bites of local anopheline mosquitoes which had previously bitten a person recently back from an endemic area. No such person could be traced. The vector was possibly *A. claviger*, which breeds in tanks, or more probably *A. plumbeus*—a tree-breeding species which is common in London.

G. R. McRobert

FAIRLEY, N. H. **Malaria in Ex-Servicemen.** [Correspondence.] *Brit. Med. J.*, 1953, Nov. 21, 1157-8.

BRITISH MED. J. 1953, Nov. 21, 1145. **Malaria in Ex-Servicemen.**

i. This letter emphasizes warnings contained in recent issues of the *Lancet* and *British Medical Journal* about fevers in men recently returned from military service abroad [this *Bulletin*, 1953, v. 50, 997, 998]. Sir Neil Hamilton Fairley draws attention to the need for keeping a sharp look-out for malarial fevers in soldiers returning home to Britain, outlines the clinical features of the tertian and subtertian types of malaria and advocates the routine early use of thick and thin blood films. He points out the importance of using 8-amino-quinoline drugs in attempting to produce radical cure of *P. vivax* infections. Emphasis is laid on the importance of *P. falciparum* infections as speedy killers in non-immunes in whom the clinical diagnosis may be difficult indeed. Sir Neil believes that chloroquine is at present the best drug for oral use in malignant malaria; quinine therapy should be given by the intravenous route in hyperinfection and in pernicious manifestations.

ii. The leading article in the *British Medical Journal* reiterates the warnings given in Sir Neil's letter. It underlines the importance of accurate knowledge of a patient's recent movements and places of residence. "There is much to be said for making such an inquiry more often in taking a history."

[At the first World Conference on Medical Education held in London in 1953, Dr. L. E. NAPIER presented a memorandum on behalf of the Royal Society of Tropical Medicine and Hygiene on the urgent importance of such routine enquiries in case-taking in temperate climates.

Perhaps it would have been advisable for the letter and leader writers to have made the point that the blood slides should be examined by a trained protozoologist.]

G. R. McRobert

PACIFICO, G. La malaria nel Sannio. [**Malaria in the Sannio Valley**]
Riv. di Malariologia. 1953, June, v. 32, Nos. 1/3, 57-60. English summary (6 lines).

This is a brief description of the increased antimalaria activity that followed the installation of an antimalaria centre in Benevento, the chief

town of the province of that name, in Campagna. DDT spraying was commenced in 1947 and extended to all infected communes. No locally acquired malaria infection has been found since 1949 but anopheline vectors and infected individuals are still occasionally to be found. It is necessary to continue control measures and extend them to areas which have had even a minimal malaria incidence.

Norman White

CAPPONI, M. Note sur le paludisme à Douala. [Note on Malaria in Douala] *Méd. Trop.* Marseilles. 1953, May-June, v. 13, No. 3, 361-4, 1 chart.

The port of Douala, situated at the mouth of the Wiuri, is the natural outlet of the Cameroons and the largest centre of population with more than 100,000 inhabitants. Hitherto nothing has been published regarding the prevalence of malaria in Douala. The results of the modest survey here recorded will serve as a basis for the evaluation of the results of antimalaria measures now being put in hand.

The town straggles over some 10 square kilometres of grass-covered marshland; the climate is hot and damp; the annual rainfall may be as high as 5 metres; the rainy season extends from May to October and tornadoes always occur in the dry season also. The clay soil is difficult to drain and numerous pools in ill-constructed ditches afford unlimited facilities for mosquito breeding. It is not surprising, therefore, that malaria is widely prevalent; malaria, intestinal parasites and tuberculosis are the chief causes of morbidity.

A. gambiae is far and away the most prevalent anopheline and the only malaria vector of importance. Other species of *Anopheles* that have been found in the neighbourhood include *obscurus*, *nili*, *rufipes*, *coustani*, *pretoriensis*, *hancocki*, *marshalli*, *squamosus*, *brunnipes*, *rhodesiensis*, *longipalpis* and *funestus*.

Between November 1951, and November 1952, the blood of 2,253 children aged 1 to 3 years attending infant welfare centres was examined. The overall parasite index was 28.7 per cent. and the gametocyte index 3.3 per cent. The spleen index of 929 children seen at these centres was 13.7 per cent.: all spleens not extending beyond the costal margin were ignored. The spleen index of 2,456 schoolchildren examined during this same period was 11.5 per cent.: these schoolchildren had all been receiving prophylactic doses of Premaline N. The parasite indices were notably higher during the rainy season. Nearly all parasites found were *P. falciparum*. *P. vivax* were rarely seen and *P. malariae* hardly ever. Blackwater fever among Europeans is a rare event and malaria is not an important cause of death among adult Africans.

Some open drainage work, the application of larvicides, the distribution of Premaline in schools, and a very limited amount of house spraying with residual insecticides are all that it has been possible to do with the limited funds that have been available hitherto.

Norman White

MOISE, R. L'incidenza dell'infezione da "Plasmodium malariae" nell'endemia malarica della Somalia. Inchiesta e studio epidemiologico. [The Incidence of *Plasmodium malariae* Infections in Italian Somaliland: Epidemiological Study] *Riv. di Malariologia*. 1953, June, v. 32, Nos. 1/3, 11-39, 7 figs. [31 refs.] English summary.

The author gives the results of observations carried out over many years regarding the incidence of *P. malariae* infections in Italian Somaliland. Such infections are much more common than hitherto believed. A few

circumscribed areas exist in which *P. malariae* is the most prevalent malaria parasite. *P. malariae* infections make no contribution to epidemic malaria: such infections are indeed most evident in years of low malaria endemicity and at seasons of the year with lowest malaria prevalence. Their contribution to malaria sickness rates of the indigenous population in the most malarious areas is almost negligible. The maximum incidence of *P. malariae* infections occurs in children of 4 years of age: infections in children are well tolerated and rarely give rise to fever, but they are very persistent. It seems probable that only *A. gambiae* and *A. funestus* are responsible for *P. malariae* transmission in Italian Somaliland.

Norman White

IYENGAR, M. O. T., MATHEW, M. I. & MENON, M. A. U. **Malaria in the Maldiv Islands.** *Indian J. Malariology*. 1953, Mar., v. 7, No. 1, 1-3.

In the course of a filariasis survey in the Maldiv Islands [this *Bulletin*, 1953, v. 50, 636] the authors studied malaria incidence in several islands of 4 southern atolls, namely Male, Haddumatti, Suvadiva and Addu. Clinical malaria was found in most of the villages and was particularly high in Addu. A table shows the spleen indices of children under 12 in 10 villages: these ranged from 25.0 to 70.0 per cent. and in 7 of the 10 villages the index exceeded 50 per cent. In one village in Addu atoll, the parasite rate was determined in 51 children and was found to be 45.1 per cent. (23 children positive). Blood smears from 98 children in villages of Addu atoll showed that of 44 positive results, *P. malariae* accounted for 26, *P. vivax* for 10, *P. falciparum* for 6, and mixed infection for 2. The predominance of the quartan type is noteworthy.

The Maldives have few anophelines, owing to a lack of natural breeding places: indeed, the only breeding places are the many shallow wells, which are the only source of fresh water and are present in almost every house: few breeding places were found in step-wells. The only two species of anophelines found were *A. subpictus* and *A. tessellatus*. The former was rare and was captured only on Gadu Island in Haddumatti atoll. *A. tessellatus* was widely prevalent and was found in 177 of 635 (27.9 per cent.) of the shallow wells during the comparatively dry period of the study: the incidence is likely to be higher in the rainy season, May to August. In step-wells, on the other hand, breeding of *A. tessellatus* was comparatively low, occurring in only 28 of 659 (4.2 per cent.): this is evidently because the water in step-wells was often grossly contaminated.

A. tessellatus was shown to be the malaria vector in the Maldives. Heavy sporozoite infection was found in 1 of 22 specimens caught in dwelling houses. It is noted that COVELL [this *Bulletin*, 1945, v. 42, 623] found 2 glands and 4 gut infections in 160 specimens of *A. tessellatus* from the Maldives.

The adults of *A. tessellatus* rest entirely indoors, near the floor in dark corners.

It seems evident that malaria, caused by *A. tessellatus* and predominantly quartan, is highly endemic in the southern atolls of the Maldiv Islands.

H. J. O'D. Burke-Gaffney

TRINIDAD GOVT. **Annual Report of the Malaria Division, Health Dept., Trinidad & Tobago.** 1952. 68 mimeographed pp., 5 graphs (3 coloured) & 5 figs.

There was no epidemic of malaria in any part of the Colony of Trinidad and Tobago during 1952, and there was an appreciable fall in malaria

transmission. The number of deaths due to malaria in the year 1943 and the years from 1949 to 1952 were 602, 148, 141, 136 and 80, respectively. Of 4,448 schoolchildren examined in Trinidad, 23 (0.5 per cent.) had enlarged spleens. The "Slide Diagnostic Service" for medical practitioners showed 19.4 per cent. positive blood films in 4,008 examined; 80.7 per cent. revealed *Plasmodium falciparum* infections and 18.2 per cent. *P. vivax*. The largest number of positive blood films originated from Sangre Grande, an *A. bellator* malaria district, where there are considerable areas which have not yet been controlled by the copper sulphate method. In Tobago, phenomenal results have been achieved. Out of 1,597 blood films examined from this previously highly malarious island only 6 were positive for malaria parasites.

By means of studies in experimental huts the entomologist assessed the value of DDT and BHC as residual insecticides against *Anopheles aquasalis* and concluded:

- (i) At the rates of application used the lethality of DDT is superior to that of BHC.
- (ii) DDT has an effective life of 5 months, as against little over one month for BHC. In the case of DDT one application per annum appears insufficient for continuous malaria control, but whether a second application when numbers are rapidly decreasing is worth the extra cost is a matter for further consideration. *A. aquasalis* is at best such a weak vector that it is only when density is very high that control seems justified.

As a measurement of lethality, these experiments are far more informative and trustworthy than the old method of applying insects, already nearly moribund from having been caught in tubes and transferred to Petri dishes, to a wall.

[It is not possible to abstract satisfactorily the details of entomological research, the results of which will be published in the *Bulletin of Entomological Research*.]

Several of the areas, now controlled by temporary measures, lend themselves ideally to a comprehensive programme of capital works that would ensure the complete eradication of anopheline production in the region; the expenditure involved would be recovered in the not too distant future by the saving on temporary measures. Two of these areas are important, one affecting Port of Spain and the other the main airport of the colony.

The "Bromeliad Control Programme" is carried out by a staff consisting of the following units, under the direct control and supervision of a Sanitary Inspector: (i) the trace cutting unit, (ii) the spray unit, (iii) the pump unit, (iv) the mosquito survey unit. The bromeliads are sprayed with a solution of copper sulphate. The survey unit checks the effect of the bromeliad treatment on mosquito density.

The residual insecticide programme was not extended beyond the districts treated in 1951; on the whole, the percentage of objections was small and this is the only country where such large-scale DDT programmes are executed without compulsory legislation.

Field tests of dieldrin were continued from 1951 and the following conclusions arrived at:

- (i) Dieldrin is effective as a larvicide in a variety of breeding places against local anophelines.
- (ii) High-spreading antimalarial oil containing dieldrin has been as effective as a similar preparation with DDT, and may be used in similar circumstances.
- (iii) Dieldrin W.P. 25 per cent., used at a dosage of 2 oz. per acre, gave

adequate control of anophelines in pools of standing water for at least 14 days. In pools which were treated several times, a cumulative effect appeared which gave control for a much longer period. Increased dosage gave increasing control and only where applications reached $\frac{1}{2}$ lb. and 1 lb. per acre were any ill effects noted on other forms of animal life in the treated water bodies.

(iv) Compared with similar formulations of DDT and BHC, dieldrin W.P. 25 per cent. gave better results than either at the standard recommended rates of application.

(v) In large-scale field trials, dieldrin W.P. 25 per cent. gave adequate control for periods of at least 14 days after application. *R. Ford Tredre*

DE SANCTIS-MONALDI, T. & RAFFAELE, G. Sulla fase negativa del sangue nell'infezione da "*Plasmodium vivax*." [**The Negative Phase of the Blood in *Plasmodium vivax* Infection**] *Riv. di Malarologia*. 1953, June, v. 32, Nos. 1/3, 1-10. [14 refs.] English summary.

The authors describe an experiment that was carried out in 1935, an account of which has not hitherto been published. Six patients requiring malaria therapy were grouped in pairs of compatible blood groups. One of each pair was inoculated with sporozoites of *P. vivax* (Campagna Romana strain) by mosquito bite. The blood of each of these infected donors (250 cc.) was injected intravenously into his partner on the fourth, fifth or sixth day after infection, respectively. The patient who received the blood transfusion on the fourth day after infection of the donor remained free from infection. The other 2 became infected. *Norman White*

ISSARIS, P. C., RASTOGI, S. N. & RAMAKRISHNA, V. **Malaria Transmission in the Tarai, Naini Tal District, Uttar Pradesh, India.** *Bull. World Health Organization*. Geneva. 1953, v. 9, No. 3, 311-33, 2 figs. [12 refs.]

The Tarai of Naini Tal district in which this WHO Malaria Control Demonstration Team worked borders on the foothills of the Himalayas (29°N., 79°E.) and is separated from them by a waterless belt of terrain 6-10 miles wide, characterized by the presence of dense forests and with a ground slope of 70-80 feet per mile. Thus the Tarai is almost a plain and because of the flatness and impervious nature of the soil the subsoil water level almost reaches ground surface, forming a large number of swamps, meandering streams and seepages.

The climate of the Tarai differs from that of the adjoining plains chiefly in the variation of temperature between day and night; to this variation is attributed the severe sickness among the inhabitants at the beginning of the hot weather and towards the end of the rainy season. The heat and humidity of the summer months render the climate distinctly enervating; May and June are the hottest and January and February the coldest months of the year. The rainy season comes in June, the highest precipitation in July and August, the rest of the year being almost dry; the average annual rainfall is about 50 inches, whereas in the adjoining afforested belt it is often double this amount. In the Tarai the perennial breeding places of mosquitoes originate from seepages.

The Tarai had, until very recently, been abandoned as uninhabitable because of the existence of hyperendemic malaria. Spleen rates in children varied from 74 to 88 per cent. and the responsible vector mosquitoes were

believed to be *Anopheles fluviatilis*, *A. minimus* and *A. culicifacies*. The Malaria Institute of India worked in this area between 1938 and 1940, during which period very low sporozoite rates were demonstrated, except in 1939 when *A. minimus* showed an infectivity rate of 18 per cent. during the height of the malaria season. The results of precipitin tests on the stomach contents of *A. fluviatilis* caught in this area and compared with results obtained on the same mosquito caught in the foothills of South India showed anthropophilic indices of 1.4 per cent. and 96.9 per cent., respectively; in consequence, *A. fluviatilis* was considered to be a zoophilic non-vector in the Tarai, and *A. minimus* to be the principal vector.

In the present investigations, 17 species of anophelines were found in the area of which *A. fluviatilis*, *A. culicifacies* and *A. minimus* were considered to be important as malaria vectors. Routine weekly adult mosquito collections from selected catching stations in unsprayed villages between 1949 and 1952 demonstrated that: (a) *A. minimus* was virtually absent; (b) *A. culicifacies* was present during the months June to October, and (c) *A. fluviatilis* was prevalent throughout the year, with larger numbers between October and June. The period of prevalence, therefore, of *A. culicifacies* is 6 to 8 weeks, compared with a period of more than 6 months for *A. fluviatilis*.

A. culicifacies was found infected with sporozoites in July, August and September, and *A. fluviatilis* in October, April and May; it is clear that *A. culicifacies* is the vector during the monsoon period, while *A. fluviatilis* is responsible for transmission during the pre- and a part of the post-monsoon periods. Over the period June 1949, to November 1952, the dissection results were as follows: *A. culicifacies*: 5,838 examined, 5 positive; *A. fluviatilis*: 9,084 examined, 7 positive; *A. minimus*: 76 examined, 0 positive. The sporozoite rates, therefore, are 0.086, 0.077 and nil, respectively. [The authors record for *A. fluviatilis* 7 positive out of 7,806 dissections, or sporozoite rate of 0.09 per cent., but have not included 1,278 dissections for 1949 to 1950 with negative results.]

Precipitin tests carried out on *A. fluviatilis* during this same period revealed the surprising result of a gross anthropophilic index of 41.2 per cent., the collections having been made from houses, cattle sheds and other outdoor resting places. These results were comparable with those claimed on a previous occasion by Senior WHITE in East Central India [this *Bulletin*, 1948, v. 45, 138]. The theory of the existence of anthropophilic and zoophilic races of this mosquito requires further investigation.

Of 132 infants under one year of age, 16 showed malaria parasites in the blood, a percentage of 12.1.

The conclusion is that in this district malaria transmission occurs mainly before, during, and after the rains; analysis of the infant parasite rates indicated that a certain amount of transmission also occurs during the remaining months of December to February. *A. culicifacies* is responsible for transmission during July, August and September, and *A. fluviatilis* in the remaining months. *A. minimus* takes no part in transmission. *A. fluviatilis* in this area is no longer zoophilic and now shows an anthropophilic index of over 40 per cent.

R. Ford Tredre

WHARTON, R. H. **The Habits of Adult Mosquitoes in Malaya. III. Feeding Preferences of Anophelines.** *Ann. Trop. Med. & Parasit.* 1953, Oct., v. 47, No. 3, 272-84. [41 refs.]

The author presents a critical examination of the published records of precipitin tests made on the blood meals of Malayan anophelines caught

resting in various situations; he concludes that they do not provide a direct indication of the basic feeding preferences of these anophelines although they are frequently quoted as showing that *A. maculatus* is anthropophilic in that country.

Among anophelines caught resting in the same place out of doors by day, precipitin tests were done on 2 occasions and showed that only 20 per cent. (of 234) and 9 per cent. (of 364) of *A. maculatus* had fed on man. Such variations in the index indicate the difficulty in obtaining a true and consistent value.

Records of human bait trapping of mosquitoes may give a false impression if the total anopheline populations are ignored; even though there may be relatively more *A. maculatus* than other species coming to the traps, the actual numbers are much smaller than those feeding on cattle.

Other figures show that there is little doubt that, in Malaya, *A. maculatus* prefers to feed on cattle, in fact all the Malayan anophelines prefer cattle to any other animal but *A. maculatus* bites man more readily than do the other species; elsewhere it does not always show this relative preference.

The factors which influence the feeding behaviour of Malayan anophelines are discussed, especially man-made ecological changes and the effect of the presence or absence of cattle. The possibility is also put forward of the existence of different forms or biological races of *A. maculatus* and certain other species, but there seems to be no evidence of this so far.

In Malaya, *A. maculatus* is a relatively inefficient vector of malaria compared with such species elsewhere as *A. gambiae* and *A. minimus*, and it cannot be said with certainty why this species and others should be of such importance in some areas and of so little importance in others.

H. S. Leeson

WHARTON, R. H. **The Habits of Adult Mosquitoes in Malaya. IV.—Swarming of Anophelines in Nature.** *Ann. Trop. Med. & Parasit.* 1953, Oct., v. 47, No. 3, 285–90, 1 map.

BRUMPT, L. & HO-THI-SANG. Les granulocytes mélanifères du paludisme. [**Phagocytosis of Pigment in Malaria**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 4, 506–10.

It is a common belief that malarial pigment is usually enclosed within free macrophages and fixed reticulocytes, but the authors point out that other types of leucocytes may also be “melaniferous”, and in cases of malignant tertian malaria they themselves have found pigment in many neutrophile polymorphonuclears, as well as in some lymphocytes, plasmodocytes and even eosinophiles. Moreover, the function of the “melaniferous” leucocytes is not merely the removal of the pigment released into the circulation after the merozoites have escaped from the ruptured host-cell, but they ingest entire parasitized erythrocytes, and are particularly attracted by those which have lost all their haemoglobin and contain fully segmented schizonts.

The authors have followed all the phases of phagocytosis of the parasites and the succession of leucocytes taking part in this process in *P. falciparum* malaria, and describe the struggle between the parasites and the phagocytes as follows. After the termination of the pre-erythrocytic phase of development, the merozoites invade the red blood corpuscles, in which they multiply, giving rise every 24–36 hours to a new generation of 12–18 merozoites. However, it is found that the degree of parasitaemia at the end of

the first week is much lower than the theoretical figure, owing to the intervention of phagocytosis. Since macrophages in the blood are available only in small numbers, and the spleen is not yet enlarged, the mature schizonts are destroyed in the first instance by the numerous polymorphonuclears circulating in the blood. In the course of the second week, with the onset of febrile paroxysms and splenomegaly, the phagocytosis is taken over by the wandering and fixed macrophages. However, if the macrophages do not replace the used-up polymorphonuclears in time, the parasitaemia may remain unchecked, with the result that the disease takes a pernicious course.

C. A. Hoare

BOQUIEN, Y., HERVOUET, D. & LHERMITTE. Sur deux formes anormales de paludisme de primo-invasion. [**Two Abnormal Forms of Malaria in Primary Infections**] *Bull. Acad. Nat. Méd.* 1953, v. 137, Nos. 25, 26 & 27, 422-5.

The first patient exhibited allergic manifestations, represented by urticaria with pruritus, oedema of the Quincke type, diarrhoea and other intestinal symptoms. The parasite was the African form of *P. vivax*. The patient came from Pointe-Noire (Middle Congo).

The second patient developed meningeal symptoms resembling those of cerebrospinal meningitis on a voyage from Dakar to Nantes. The parasite in this case was *P. falciparum*.

In each case antimalarial treatment brought about rapid cure.

Philip Manson-Bahr

REITANO, U. & BONANNO, S. Il problema della malaria cronica. Sua attualità in Italia. [**The Problem of Chronic Malaria. Its Present Importance in Italy**] *Acta Med. Italica.* 1953, Aug., v. 8, No. 8, 197-202. [35 refs.] English summary.

A man 56 years of age came to hospital in July 1952, complaining of asthma from which he had suffered for about 2 years, but much more in recent months. The malady was found to be partly respiratory, partly cardiac. He had attacks of malaria in Serbia in 1918 for which he had been given a long course of quinine. Repeated attempts to find the parasite in blood smears, in the bone-marrow and after adrenaline administration all failed, but a general paralytic coming for treatment presented an opportunity of testing the malarial nature of the complaint of the first patient and 8 cc. of sternal marrow were injected. After a long interval, on the 28th day, indications of tertian fever appeared and rings and gametocytes of *P. falciparum* were seen in the peripheral blood, but not in marrow smears. Injection of 10 cc. of blood into another general paralytic did not give rise to any febrile attacks and search for parasites in the blood was persistently negative.

The authors stress the public health importance of this latent afebrile malaria infection should anophelism, now under control, become rife again.

H. Harold Scott

RAMOS, A. DA S. Malária e gravidez. [**Malaria and Pregnancy**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1952, Sept., v. 17, No. 53, 407-28. [Numerous refs.] English summary.

This lengthy study is almost exclusively confined to published work concerning the influence of malaria on pregnancy and *vice versa*, including congenital malaria. The author's own observations have not as yet yielded results of any significance.

Norman White

PLOYÉ, M. Précis d'emploi de la quinine. Hier et aujourd'hui. [A Summary of the Uses of Quinine Yesterday and Today] *Rev. Paludisme et Méd. Trop.* 1953, Aug.-Sept.-Oct., v. 11, No. 108, 65 pp.

BUITRAGO H., R. Consideraciones sobre un caso de Ambliopia quinínica permanente. [Observations on a Case of Permanent Quinine Amblyopia] *Nicaragua Med.* 1952, Nov., v. 8, No. 11, 387-91, 1 fig.

MEIN, R. M. Camoquin in the Treatment of Human Malaria. *Amer. J. Trop. Med.* 1951, Mar., v. 31, No. 2, 212-17.

"1. 247 patients with malaria were treated with Camoquin. There were 156 patients in the *vivax* infection group, 86 patients in the *falciparum* infection group, and 5 patients in the *malariae* infection group.

"2. There were 19 readmissions to the hospital in the *vivax* group; of these 19 patients four patients had two or more readmissions. There were no readmissions in the *falciparum* or *malariae* group.

"3. Clinical symptoms were controlled within 24 to 48 hours.

"4. There were no toxic reactions to the drug."

[It is regretted that owing to an oversight in routine, an abstract of this paper was not included in an earlier edition of this *Bulletin*.]

JASWANT SINGH, RAY, A. P. & MISRA, B. G. 4-Aminoquinolines in the Single Dose Treatment of Malaria. *Indian J. Malariology.* 1953, Mar., v. 7, No. 1, 19-25. [19 refs.]

These investigations were conducted in 2 centres in Uttar Pradesh State, North-west India, during a period of active malaria transmission.

In one series 199 patients suffering from malaria (77 *P. vivax* and 122 *P. falciparum*) were treated with a single dose of 0.6 gm. (base) of resochin (chloroquine diphosphate), nivaquine (chloroquine sulphate) or amodiaquine (camoquin). In a second series 62 patients (15 *P. vivax*, 47 *P. falciparum*) received a single dose of 0.4 gm. of resochin or amodiaquine.

Asexual parasite clearance resulted in all cases within 72 hours, irrespective of the type of infection, antimalarial drug used or dose. With the higher dosage there was practically no difference in the parasite clearance rate over the first 48 hours, though during the first 24 hours the action of amodiaquine appeared to be somewhat more rapid than that of the chloroquine salts, particularly in respect of *P. falciparum* cases treated with nivaquine. The *P. falciparum* patients treated with 0.4 gm. of resochin or amodiaquine responded more slowly to treatment than those who received 0.6 gm. of these drugs.

G. Covell

SRIVASTAVA, R. S., CHAKRABARTI, A. K. & MUKHERJEE, S. K. Therapeutic Trial of Pyrimethamine (Daraprim) in Human Malaria. *Indian J. Malariology.* 1953, Mar., v. 7, No. 1, 5-12, 3 charts. [13 refs.]

The investigations here recorded were carried out in a highly malarious foothill area in the State of Uttar Pradesh, North-west India, during a period of active transmission. Eighty-six villagers suffering from malaria (71 *P. falciparum*, 10 *P. vivax*, 5 mixed *P. falciparum* and *P. vivax*) were treated with pyrimethamine under the following régimes:

I—A single dose of 50 mgm.

II—A single dose of 50 mgm. on 2 consecutive days.

III—A single dose of 25 mgm.

IV—25 mgm. twice daily for one day.

V—25 mgm. twice daily for 2 consecutive days.

Children received proportionately smaller doses in each group.

In the *P. vivax* cases relief of symptoms and clearance of parasites occurred in all groups within 48 hours.

The majority of the *P. falciparum* patients became afebrile within 72 hours, but fever persisted in 3 cases under régime I and in one under régime III up to 96 hours. In some instances after initial relief of symptoms fever recurred after 24 to 48 hours, particularly in those under régime IV, where 4 out of 13 cases behaved in this manner. In one case the drug had no apparent effect whatever on the course of the disease. Three out of 12 patients who were originally afebrile developed fever 24 to 48 hours after commencement of treatment (2 under régime V, one under régime III). Asexual parasite clearance was achieved in most cases within 72 hours, but in 4 out of 13 cases under régime IV and one under régime III parasitaemia was observed beyond this period. The best results were achieved under régime V.

[These findings emphasize the unsuitability of pyrimethamine as a therapeutic agent for *P. falciparum* malaria.] G. Covell

JASWANT SINGH, MISRA, B. G. & RAY, A. P. **Effect of Pyrimethamine in Human Malaria (Suppressive Treatment). Part III.** *Indian J. Malariology*. 1953, Mar., v. 7, No. 1, 13-18. [11 refs.]

The investigations here recorded were carried out at 4 experimental stations in Uttar Pradesh State, North-west India, during a period of active malaria transmission. Three hundred and four persons were placed on suppressive treatment over a period of 8 to 10 weeks. One hundred and fifty received 25 mgm. of pyrimethamine and 154 received 50 mgm. weekly, in a single dose. Children between 3 and 12 years of age were given half the adult dose and those below 3 years one-quarter the adult dose.

Under both régimes there was a dramatic reduction in parasitaemia between the fifth and sixth weeks, and by the end of 10 weeks parasite rates at all stations had fallen to nil. Spleen rates were considerably reduced at 2 of the stations, though there was little difference in this respect at the other two. In a comparison group receiving no antimalarial drug both parasite and spleen rates were found to have increased during the same period.

There was one case of overt malaria [species of parasite not stated] among those under régime I, this being the only genuine break-through observed. The general health of the population under suppressive treatment was considerably improved, compared with that of the untreated population, and the attendance at school was also higher. There was also a marked reduction in the dispensary figures. G. Covell

JASWANT SINGH, MISRA, B. G. & RAY, A. P. **Suppressive Treatment with Amodiaquin.** *Indian J. Malariology*. 1953, Mar., v. 7, No. 1, 27-31.

The inhabitants of 3 villages in the foothills of Uttar Pradesh State, North-west India, were placed on suppressive treatment with amodiaquine over a period of 10 weeks in the malaria transmission season. Two régimes of dosage were adopted.

Under régime I all persons above 12 years of age received a single weekly

dose of 0.3 gm. base ($1\frac{1}{2}$ tablets). Children from 4 to 12 years of age were given 0.2 gm., those from 1 to 4 years 0.1 gm. and those below 1 year 0.05 gm. Under régime II double the dose was given to all groups, but the drug was administered only once a fortnight. There were 161 persons under régime I and 125 under régime II. The latter group consisted mostly of adults. The inhabitants of 2 other villages who received no antimalarial drug were observed for purposes of comparison.

At the end of 10 weeks the parasite rate in both the treated groups had fallen almost to nil and there was a marked reduction in the spleen rate. In the 2 comparison villages both these rates increased during the same period. Only 7 cases of overt malaria occurred among those on suppressive treatment, and all of these were in persons who had not been under the direct supervision of the authors. Both régimes proved equally effective.

Attention is drawn to the advantage of using a fortnightly régime in areas where communications are difficult. G. Covell

KNIFE, F. W. **The Place of Water Surface Preparation in an *Anopheles* Mosquito Control Programme.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1953, Sept., v. 1, No. 5, 139-47.

The residual insecticide technique has been effective in controlling malaria in many parts of the world but this has not involved eradication of the anopheline vectors.

Recurrent and expensive residual spray operations will continue to be necessary, particularly where expansion of industry, of agriculture and of transportation is taking place. Experience has shown that control of water surfaces is of great importance in such projects irrespective of possible supplementary larviciding. This manipulation of water surfaces would include the following: (a) Elimination of the breeding place. (b) Reduction of the water surface to the smallest possible area. (c) Preparation of the surface area for treatment and inspection for larvae. (d) Fluctuation of the water surface at the periphery, as in impoundment areas. (e) Wetting and drying, as in intermittent irrigation. (f) Environmental sanitation.

Stream training, clearance of vegetation, removal of obstructions to water flow, canalization, deepening and filling, all have their part to play in reducing the mosquito breeding potential of water surfaces.

In short, the basic principles of water-surface preparation are: if it is water, clean it (remove obstructions and vegetation); if it is standing water, remove it (drain or fill); if it is moving water, compress it (reduce surface area); if it is hidden water, expose it (make it accessible to control and inspection).

[This paper is a reminder that, although malaria may be controlled by residual insecticides, the mosquito menace remains.] R. Ford Tredre

SHARMA, M. I. D. & RAJINDAR PAL. **Comparative Field Studies on the Residual Effectiveness of D.D.T., B.H.C., D.D.T. and B.H.C. Combined Spray, and Dieldrin against Mosquitoes.** *Indian J. Malariology.* 1952, Sept., v. 6, No. 3, 317-24.

The antimalarial house-spraying trial in the Palwal district south of Delhi [this *Bulletin*, 1952, v. 49, 753] was continued in 1951. In this season the following insecticides and combinations were tested, each one in a separate village of 20 to 100 houses, with 100 to 500 inhabitants: (i) 50 mgm. DDT (as suspension), (ii) 10 mgm. gamma BHC (as suspension), (iii) 25 mgm.

DDT plus 5 mgm. *gamma* BHC (as suspension), (iv), (v), (vi) as (i), (ii), (iii), respectively, but as emulsions, (vii) 50 mgm. dieldrin (as emulsion). All doses are per sq. ft.

The effectiveness of the treatments was judged by regular collections of mosquitoes knocked down by pyrethrum spray in a treated house and in an untreated catching station. Similar counts were made at an untreated village. The duration of effectiveness of the various treatments may be judged from the following table:

Treatment	Dose: mgm. per sq. ft.	Period before	
		mosquitoes approached 50% pre-treatment level (weeks)	abrupt rise in sprayed/un- sprayed house mosquito rates (weeks)
(i) DDT (susp.)	50	6	6
(ii) γ BHC (susp.)	10	7	7
(iii) DDT + γ BHC (susp.)	25+5	8	8
(iv) DDT (emul.)	50	*	7
(v) γ BHC (emul.)	10	*	4
(vi) DDT + γ BHC (emul.)	25+5	*	6
(vii) Dieldrin (emul.) ...	50	5	5

* A decline in natural mosquito population renders these results unreliable.

J. R. Busvine

RAJINDAR PAL & SHARMA, M. I. D. **Behaviour of Mosquitoes in relation to Insecticidal Applications.** *Indian J. Malariology*. 1952, Sept., v. 6, No. 3, 281-301, 2 figs. (1 on pl.) & 1 chart. [19 refs.]

This paper records further observations on malaria control experiments in the Palwal district, about 36 miles south of Delhi [see JASWANT SINGH *et al.*, this *Bulletin*, 1952, v. 49, 753]. In addition to use of window traps, catches of mosquitoes inside treated and untreated houses were made at intervals of 2 hours throughout the night. The mosquitoes caught were separated into *A. culicifacies* and "other anophelines" and were graded as: unfed, fully fed, half gravid or gravid. The most striking observation was the fact that residual spray deposits had no appreciable effect on entry of the mosquitoes or their feeding habits. About 41 per cent. entered before midnight, mainly before 6 p.m., in both cases. After 8 p.m. there was a sharp decline in unfed mosquitoes and a corresponding rise in fed ones; feeding, therefore, generally occurs rather early. Towards dawn there was another increase in unfed mosquitoes and a decline in the numbers of gravid females, which were tending to leave and oviposit. These observations concern all anophelines: the data for *A. culicifacies* appear similar, but the numbers were rather small for detailed conclusions to be drawn.

As regards insecticides, the effects on mosquito behaviour of the following treatments were studied: (1) 50 mgm. per sq. ft. DDT applied as a suspension; (2) the same treatment applied as emulsion; (3) 10 mgm. per sq. ft. *gamma* BHC applied as suspension.

A comparison of the proportions caught in the window traps with those in the houses showed that the DDT suspension had a strong irritant-repellent effect, which was not, however, evident with the emulsion residue. The *gamma* BHC treatment was moderately repellent for a week or two after application. The 24-hour survival of the mosquitoes from untreated houses was not high (29 to 43 per cent.). Mosquitoes from the DDT-suspension treated houses reached this level in 3 weeks; from the DDT-

emulsion houses in 5 weeks; but over 97 per cent. still died in BHC-treated houses after 6 weeks.

J. R. Busvine

See also p. 233, VISWANATHAN, **Analysis of Residual Deposits of D.D.T. on Sprayed Surfaces.**

RODHAIN, J. La réceptivité de quelques roussettes africaines à *Plasmodium berghei*, Vincke et Lips. [**Susceptibility of African Bats to *Plasmodium berghei***] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 3, 315-18, 1 fig. on pl.

The author describes the results of inoculation of 3 species of African bats with *Plasmodium berghei* (mouse strain).

One specimen of *Eidolon helvum* proved to be refractory to infection until it was splenectomized, when parasites appeared in its blood and persisted for one month, after which the animal died. Two specimens of *Epomophorus haldemani* proved to be highly susceptible to this parasite and developed an acute infection, from which they died in about a fortnight. Four *Micropteropus pusillus* likewise acquired heavy infections which killed them in 3 to 4 weeks.

C. A. Hoare

RODHAIN, J. L'action de la diète lactée sur les infections à *Plasmodium berghei*, *Plasmodium vinckei* et *Babesia rodhaini* chez les souris. [**Action of Milk Diet on *P. berghei*, *P. vinckei*, and *Babesia rodhaini* in Mice**] *Ann. Soc. Belge de Méd. Trop.* 1953, June 30, v. 33, No. 3, 245-57.

Adult and baby white mice were placed on a milk diet (plus vitamins) and were then heavily infected with (a) *Plasmodium vinckei* or (b) *P. berghei* (strain IV and strain Mukata I) or (c) *Babesia rodhaini*. Control mice were placed on an ordinary diet and received identical inocula of the parasites. The milk diet suppressed *P. vinckei* in 2 to 5 days; one of these mice was put back on a normal diet on the ninth day, and it shortly afterwards developed a chronic *P. vinckei* infection. Another older animal, returned to a normal diet, did not relapse. The inhibitory action seemed to be chiefly on the asexual forms, particularly on those approaching the schizogonic stage; gametocytes were less affected though some showed morphological changes. Suppression of 2 highly virulent strains of *P. berghei* was much less obvious, 3 mice out of 4 dying of the infection, which is always fatal in mice on a normal diet. Five mice on a milk diet developed fatal infections after inoculation with *B. rodhaini*, and the author thinks that the different response of this parasite is due to the different metabolic requirements of the piroplasm—unlike *Plasmodium*, this parasite is able to metabolize the whole of the haemoglobin of the erythrocyte, no pigment remaining behind; also its mode of reproduction is entirely different, being by binary fission instead of by schizogony, which is the stage particularly affected by insufficiency of p-aminobenzoic acid.

P. C. C. Garnham

RAMAKRISHNAN, S. P. **Studies on *Plasmodium berghei* n. sp. Vincke and Lips, 1948. VIII. The Course of Blood-Induced Infection in Starved Albino Rats.** *Indian J. Malariology.* 1953, Mar., v. 7, No. 1, 53-60. [17 refs.]

American authors found [see GEIMAN and MCKEE, this *Bulletin*, 1952, v. 49, 331] that when monkeys were infected with *P. knowlesi* and starved

for 24 to 48 hours the degree of parasitaemia was markedly reduced. They also found that when fasting animals were inoculated with the same parasite a very light infection resulted during the period of fast, and reached normal intensity when the animals were returned to full diet. The present investigation, in which *P. berghei* infections in albino rats were used, was carried out in similar fashion. The animals were 6 to 8 months old, and a few animals 2 months old were also used. They received an inoculum of 1 million parasites intraperitoneally in a volume of 0.1 ml. Thin smears of blood were examined daily and the degree of parasitaemia was determined. When no parasites were seen in 100 fields of the microscope with an oil-immersion lens the blood was described as negative.

Periods of starvation varied from 5 to 10 days and were arranged at different intervals relative to inoculation. One control group of 5 animals was totally starved of food and water and all died within 8 days without showing parasites in the blood. Another group of 5 rats receiving normal diet was also used as a control. The younger rats were used in confirmation of the results obtained with older animals and the interesting observation was made that the latter repressed infection more than the former under similar conditions. Starvation as observed in uninfected animals gave rise to haemoconcentration for a few days at the start and there was a relative increase in lymphocytes. A fall in the number of red and white cells followed. It was not determined whether the excess lymphocytes were directly responsible for the decline in parasitaemia. The present findings were similar to those of the American authors for *P. knowlesi* in monkeys. The shorter period of 5 days' starvation controlled parasitaemia and an upsurge of infection followed return to normal diet. When the period of starvation lasted for 10 days parasites did not appear when a full diet was given.

The authors suggest that the absence of one or more essential metabolites in the blood (the authors mentioned above showed that methionine or *p*-aminobenzoic acid could reverse the effect of starvation) or ketosis as a result of starvation was responsible for suppression of infection. The reduction in the number of parasites compared with controls, which accompanied the change from starvation to full diet, suggested that immunity to infection had developed during the sub-patent period. *J. D. Fulton*

RAMAKRISHNAN, S. P., SATYA PRAKASH, KRISHNASWAMI, A. K. & CHANAN SINGH. *Studies on Plasmodium berghei* n. sp. Vincke and Lips, 1948.

IX. Effect of Milk Diet on the Course of Blood-Induced Infection in Albino Rats. *Indian J. Malariology*. 1953, Mar., v. 7, No. 1, 61-5.

In the preceding paper Ramakrishnan has shown that starvation of the rat host prevented normal multiplication of *P. berghei*. The present investigation deals with the effect on the infection of a diet composed wholly of milk. The techniques used were similar to those described above. The animals were housed individually and "had no access to their excreta at any time". In one experiment the effects on infection of milk and normal diets were compared and in another those of continuous milk diets were compared with results obtained when milk was given for the first 10 days only and was followed by a normal diet. The conditions of feeding described by MAEGRAITH *et al.* were followed [this *Bulletin*, 1953, v. 50, 384].

Four criteria were employed for comparing the effect of diet during the acute phase of the infection, namely, duration of parasitaemia, numbers of parasites at peak of parasitaemia, day on which peak occurred, and the average number of parasites present in blood smears each day. Parasites

were seen in all animals on milk diet for 15 to 16 days but the intensity was less than in those receiving a balanced diet plus milk. [This result is somewhat different from that described by MAEGRAITH *et al.* who rarely found parasites in animals on a diet wholly composed of milk.] There was no appreciable difference in the weight gain of experimental and control animals.

In summary the authors state "The course of *P. berghei* infection in rats on an exclusive milk diet was milder than in those on milkless diet as well as diet which included milk. It has been concluded that such an effect was most probably due to some deficiency in milk". J. D. Fulton

See also p. 154, REFAAT and BRAY; MAEGRAITH, **Milk and Protozoal Infections.**

FABIANI, G. & FULCHIRON, G. Démonstration *in vivo* de l'existence d'un pouvoir protecteur dans le sérum de rats guéris de paludisme expérimental. [**Demonstration *in vivo* of Protective Power of Serum from Rats recovered from Malaria**] *C.R. Soc. Biol.* 1953, Jan., v. 147, Nos. 1/2, 99-103.

For this study of the protective power of the serum of rats which had recovered from an infection with *Plasmodium berghei*, the heart blood was collected from animals which were on the point of recovery, or were immune, or hyperimmune as the result of superinfections. The experiments were carried out by injection into 21 "clean" rats of the immune sera, accompanied or followed by intraperitoneal inoculation of massive doses of parasitized erythrocytes. The results were checked by following the course of parasitaemia and correlating it with the degree of reticulocytosis in the experimental rats [this *Bulletin*, 1953, v. 50, 482, 483].

It was shown that serum obtained from rats in the terminal stage of the infection (parasitaemia below 0.1 per cent.) afforded only slight or no protection, while the serum of immune and hyperimmune animals prevented the development of high parasitaemia and retarded its rise. However, the protection produced by a single injection of serum was of short duration (1-2 days). Daily injections of serum from several immune rats were insufficient to prevent the infection but merely inhibited its development for 5 days.

C. A. Hoare

FABIANI, G. & FULCHIRON, G. Comportement des hématozoaires de réinoculation dans la cavité péritonéale de rats guéris d'infection à *Plasmodium berghei*. Mise en évidence de la phagocytose des parasites. [**Behaviour of Parasites after Intraperitoneal Inoculation into Rats recovered from an Infection with *Plasmodium berghei*; Demonstration of Phagocytosis**] *C.R. Soc. Biol.* 1953, Jan., v. 147, Nos. 1/2, 103-6. [10 refs.]

When large doses of *Plasmodium berghei* are inoculated intraperitoneally into rats, the parasitized erythrocytes penetrate through the serous membrane into the blood. But when similar inoculations are performed in immune rats, the parasites penetrate through the peritoneal membrane in small numbers and for a short period, or fail to do so at all.

In order to determine the mechanism of immunity, massive doses of parasitized erythrocytes were inoculated intraperitoneally into immune and hyperimmune rats, and their fate was observed in samples of the exudate

removed by puncture of the peritoneal cavity at different intervals of time. In these samples there was no evidence of lysis or agglutination, the parasites undergoing no morphological changes and developing normally by schizogony for several hours. On the other hand, there was a rapid macrophage reaction, involving intense phagocytosis of the parasites introduced into the peritoneal cavity. It is concluded that the mechanism of immunity in *P. berghei* infection is cellular, while the protective rôle of immune serum described in the preceding paper is due to its opsonic action.

C. A. Hoare

FABIANI, G., VARGUES, R. & FULCHIRON, G. La réaction de Henry dans le paludisme expérimental du rat blanc (*Pl. berghei*). [**Henry's Reaction in Experimental *P. berghei* Infection in White Rats**] *C.R. Soc. Biol.* 1953, Mar., v. 147, Nos. 5/6, 430-32.

Henry's reaction was performed on the serum of rats infected with *Plasmodium berghei*; either the melano-ferric antigen or Henry's original haemozoin was used. Both methods gave similar results, though the former was more instructive in that a numerical appreciation was obtained. Before infection and for a few days later the result was negative; then the intensity of the reaction began to rise and reached a high figure at the crisis or at the moment of death from the disease. The peak figure did not occur until about a week after spontaneous cure when parasites appeared to be absent from the blood. The reaction then declined slowly and disappeared 3 or 4 months after cure—i.e. at the time when premunition ended or when parasites have entirely disappeared from the host. During these 3 or 4 months, splenectomy will revive the infection and Henry's reaction will again become positive.

P. C. C. Garnham

SIDDONS, L. B. **Screening of Antimalarial Compounds in Mice with *Plasmodium berghei* Infection.** *Indian J. Malariology.* 1953, Mar., v. 7, No. 1, 41-52, 1 chart. [17 refs.]

The methods used in the present tests were based on those described by CURD *et al.* [this *Bulletin*, 1946, v. 43, 394]. Mice of each sex, 6 to 7 weeks old and of weight 16 to 24 gm., were used in groups of 5. The standard inoculum consisted of 20 million parasitized erythrocytes given intraperitoneally. Drugs were given orally in solution or suspension twice daily over a period of 3½ days at a dosage approximating to the maximum tolerated in the first instance. Stained blood films were examined on the day after treatment ended and the infection rate of 500 cells was determined. A drug was considered active if parasitaemia was reduced by 75 per cent. compared with controls and the amount required to effect this result was regarded as the minimum effective dose [MED]. When a negative finding was made up to 30 days or beyond on twice-weekly examination of stained films, subinoculation of blood was made to a clean mouse to determine if infection was still present.

Data obtained with recognized antimalarials were compared with those for the compounds being tested. It was concluded that blood-induced infections of *P. berghei* reacted to antimalarials like similarly induced infections of *P. vivax* and *P. falciparum* rather than those of avian plasmodia, but the mechanism of cure is regarded as being different. The minimum effective dose of quinine was found to be 60 mgm./kgm. in the present tests and the quinine equivalents to proguanil, chloroquine and sulphathiazole were found to be 8.6, 20 and 20 respectively. Proguanil

effected 90 per cent. of cures in these tests and some sulphanilamide derivatives were able to eradicate the infection. The results for substances of widely different constitution are given in tables and should be consulted in the original.

J. D. Fulton

THURSTON, June P. **The Chemotherapy of *Plasmodium berghei*. I. Resistance to Drugs.** *Parasitology*. 1953, Nov., v. 43, Nos. 3/4, 246-52. [31 refs.]

Strains of *P. berghei* have been made resistant to sulphadiazine, pyrimethamine and methylene blue by treating acute infections in mice with low doses of drug. The cross-resistance of strains with a number of other antimalarials, including the active metabolite or proguanil [this *Bulletin*, 1952, v. 49, 362] has also been investigated. In carrying out tests of resistance mice were inoculated with 1 million parasites of the parent or treated strain and treatment was given for 4 days with minimal effective doses (MED) of drug (an amount which reduced parasitaemia to 1/50th of that in controls), and the degree of activity was compared. It was found that 100-fold resistance to sulphadiazine was present after 12 months, 10-fold resistance to pyrimethamine after 5 months, and slight resistance to methylene blue after 4 months of treatment. Data obtained showed that the same amounts of PAB and folic acid antagonized the MED of sulphadiazine alike in the parent and resistant strain, although for the latter strain the amount was many times greater than the former. It may happen that as in the case of bacteria the resistant parasite produces an increased amount of metabolites to counteract the action of the drug.

The sulphadiazine- and pyrimethamine-resistant, but not methylene-blue-resistant, strain of *P. berghei* was cross-resistant to some of the drugs tested. It is suggested that the resistant strains are cross-resistant to drugs which affect the dividing nucleus of the parasite, and that a similar mode of antimalarial action is involved.

J. D. Fulton

VEROLINI, F. Sviluppo di forme endostiocitarie di *Plasmodium gallinaceum* in culture di tessuto splenico prelevato da polli, inoculati con sangue, in periodo precedente l'invasione endostiocitaria. [**Exoerythrocytic Development of *Plasmodium gallinaceum* in Culture of Splenic Tissue of Fowls inoculated with Erythrocytic Parasites**] *Riv. di Parassit.* Rome. 1953, Jan., v. 14, No. 1, 7-14, 7 figs. [14 refs.] English summary.

The object of the investigation described in this paper was to determine whether exoerythrocytic forms of *Plasmodium gallinaceum* will develop in cultures of splenic tissue obtained from fowls which have been inoculated with the blood of donors whose organs are free of EE forms. For this purpose the blood of the donors was taken at the onset of the primary attack (3rd day), while portions of the spleen of the recipients were removed during the first 11 days of their primary attack. The tissue cultures were prepared and maintained by Jacoby's method [see HAWKING, this *Bulletin*, 1946, v. 43, 410]. In 5 out of 8 fowls used in these experiments, the cultures revealed typical EE stages of development in the fragments of spleen, when examined in fixed and stained preparations after several days' growth. It was thus shown that EE forms can develop in tissue culture under the conditions described, but it could not be ascertained whether they had arisen from EE stages already present in the splenic tissue, or from

erythrocytic parasites. The appearance of the EE stages in tissue culture is shown in several photomicrographs.

C. A. Hoare

JASWANT SINGH, NARAYANDAS, M. G. & RAY, A. P. **Assay of Antimalarials against the Sporogony Cycle of *P. gallinaceum*. Part I.** *Indian J. Malariology*. 1953, Mar., v. 7, No. 1, 33-9. [14 refs.]

TERZIAN [this *Bulletin*, 1948, v. 45, 767; 1949, v. 46, 609] by feeding mosquitoes on glucose solution containing certain drugs was able to evaluate the action of these compounds on the sporogony cycle of malarial parasites in the insect hosts. The present authors have employed a similar technique in assaying M.3349, a precursor of proguanil, proguanil itself, and pyrimethamine against the development of *P. gallinaceum* in *Aedes aegypti*. Glucose solution was used in a concentration of 4 per cent., and the concentration of drugs dissolved in the glucose solution which could be tolerated by the mosquito was first determined before feeding on the infected host. These concentrations ranged from 0.0001 to 1.0 per cent.

Dissection of mosquitoes was carried out from the third to the fifteenth day after the infective feed. The number and size of oöcysts were recorded and when oöcysts were present some mosquitoes of the same batch were allowed to feed on normal fowls and their glands were also injected into the same fowls. More than 5,000 mosquitoes were used for assay of the compounds, several thousand more for assaying toxicity of the drug, and a total of 680 were dissected.

The results obtained for proguanil agreed with those of Terzian, gland infections being absent when mosquitoes imbibed solutions of 0.01 to 1.0 per cent. strength. Similar results were obtained with pyrimethamine. At the maximum tolerated concentration of 0.1 per cent. M.3349 was ineffective. Thus proguanil and pyrimethamine have prophylactic action in the vertebrate and invertebrate hosts.

J. D. Fulton

MUDROW-REICHENOW, Lilly. Die gametozide Wirkung des Primaquine im Tierversuch verglichen mit Plasmochin. [**Comparative Gametocidal Action of Primaquine and Pamaquin in Animal Experiments**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, Mar., v. 4, No. 2, 161-75, 1 fig. [19 refs.]

The author describes the results of chemotherapeutic tests of primaquine and pamaquin [plasmoquine] on the gametocytes of avian *Haemosporidia*, using Java sparrows [*Munia oryzivora*] infected with *Haemoproteus oryzivora*, birds infected with *Plasmodium cathemerium*, and chicks infected with *P. gallinaceum*.

It was found that the minimum dose of both drugs, which freed the blood of the gametocytes of *Haemoproteus* for at least 9 days, was between 0.02 and 0.01 mgm. given daily for 6 days. Comparable doses of the 2 drugs also had a similar effect on the exflagellation of *Plasmodium cathemerium*. Untreated birds, in the blood of which exflagellation of the microgametocytes *in vitro* took place within 5 minutes, were treated with one or the other drug, and 5 hours later the blood was again examined for exflagellation. It was shown that in both cases doses of 1/12,000-1/50,000 gm. in 1 cc. solution per 20 gm. body weight inhibited exflagellation.

Finally, tests were carried out on the effect of the drugs on the development of the parasites in the mosquito. In one experiment batches of *Aedes aegypti* were allowed to feed on a fowl infected with *P. gallinaceum*

as follows: (1) before treatment, when gametocytes were numerous in the blood; (2) 17 hours after the fowl was treated orally with 4 mgm. primaquine per kgm. and the number of gametocytes had dropped considerably; (3) 43 hours after treatment, when the infection reached a low level. The results were determined by examination of the mosquitoes for oöcysts and sporozoites. Although in mosquitoes fed on the control birds (before treatment) oöcysts (average 21) developed on the stomachs of all and sporozoites in the salivary glands of the majority, in mosquitoes fed on fowls 17 hours after treatment both oöcysts and sporozoites failed to develop. However, sporogony was completed in some of the mosquitoes of the third group, suggesting that with time primaquine might be inactivated in the fowl.

In another experiment, the effect of primaquine and pamaquin on sporogony was tested in *Aedes aegypti* infected with *P. gallinaceum*. After mosquitoes were fed for 3 weeks on 5 per cent. sugar water to which various concentrations of the drug were added, there was no effect on the development of the oöcysts, but the drugs prevented the invasion of the salivary glands or destroyed the sporozoites which had already penetrated into them.

From these observations it is concluded that the effect of primaquine in human malaria will probably be found to correspond to that of pamaquin.

C. A. Hoare

MICKS, D. W. & McCOLLUM, Venice. **The Infection of *Anopheles quadrimaculatus*, a Human Malaria Vector, with *Plasmodium cathemerium*, an Avian Malaria Parasite.** *Amer. J. Trop. Med. & Hyg.* 1953, Sept., v. 2, No. 5, 930-32. [16 refs.]

Batches of *Anopheles quadrimaculatus* and *Culex quinquefasciatus* [*fatigans*] were fed simultaneously on canaries infected with *Plasmodium cathemerium* (3H - 2 strain). Twenty-seven per cent. (with an average number of 50 oöcysts per gut) of the former and 75 per cent. (with an average number of 184 oöcysts) of the latter were infected in one experiment, and 50 per cent. (95 oöcysts) of the former and 93 per cent. (155 oöcysts) of the latter were infected in a second experiment. Other batches of *Anopheles quadrimaculatus* were also fed, involving a total of 120 mosquitoes with an overall gut infection rate of 25.8 per cent. The oöcysts reached maturity, but sporozoites never appeared in the salivary glands, even as late as 21 days after the infective feed.

P. C. C. Garnham

See also p. 226, BECKER, **How parasites tolerate their Hosts.**

TRYPANOSOMIASIS

DEBEIR. **Ocular Disturbances and Toxic Amblyopia in the Course of Sleeping Sickness.** *Bureau Permanent Inter africain de la Tsé-Tsé et de la Trypanosomiase No. 200/T.* [Léopoldville (Congo Belge).] 7 mimeographed pp. 1953, June 29.

This is a mimeographed report of the findings on ophthalmological examination of 127 patients suffering from sleeping sickness and being treated for it with tryparsamide in Usumbura, Belgian Congo. The eyes

were examined before the treatment began, before each injection of tryparsamide, and after the treatment was finished. The account is written factually and concisely, and so it does not readily lend itself to further condensation in the form of a summary; it should be consulted in the original by those interested.

Among other matters the author states that there is a directly proportional relationship between the incidence and the severity of ocular complications and the lymphocyte count in the cerebrospinal fluid; 20 per cent. of those patients with high cell counts suffered from ocular troubles; 1 in 5 of these if treated with tryparsamide may become blind. The use of sodium "hyposulphite" [presumably thiosulphate] injections with the tryparsamide treatment does not affect the incidence or severity of eye complications. Ocular changes do not develop when the disease improves; the reverse is the case, and deaths are more common in patients with eye changes than in those without them. The changes are nearly always bilateral, the earliest are night-blindness and contraction of the visual fields; the onset of blindness may be early, and it may be very sudden—within an hour of an injection in one case. The prognosis is always grave; but the use of Mel B (Arsobal) appears to be attended by much less risk of ocular troubles than the use of tryparsamide in late cases of sleeping sickness.

It is the tryparsamide that is chiefly responsible for blindness in trypanosomiasis, and not the disease; no cases of trypanosomal involvement of the eye structures with keratitis, choroiditis, and similar changes, have been encountered by the author. When eye complications develop tryparsamide treatment must be stopped; the cerebrospinal fluid should be drained, firstly to remove toxin and secondly to increase the permeability of the meningeal barrier. Repeated (daily) puncture of the anterior chamber of the eye is also advocated, with a view to producing vaso-dilatation, the elimination of toxin, and the "production of corticoide substances". These measures, together with big doses of vitamins B1 and A, "placenta treatment under conjunctival" [this is not explained] and the use of vaso-dilators (such as intravenous novocaine) are claimed by the author to have restored to a remarkable degree the central vision in 8 of 16 affected patients.

A. R. D. Adams

FRIEDHEIM, E. A. H. Mel B in the Treatment of Tryparsamide Resistant *T. gambiense* Sleeping Sickness: Observations on Drug Resistance in the Trypanosomes of the French Cameroun. *Amer. J. Trop. Med.* 1951, Mar., v. 31, No. 2, 218-35.

"1. Strains of trypanosomes are to be found in the French Cameroun which are resistant to tryparsamide only, or in addition to tryparsamide, to one, or several drugs of the group tartar emetic, orsanine, amidines, moranyl.

"2. Ninety seven per cent out of 394 tryparsamide resistant patients responded favorably to treatments with Mel B; three per cent were Mel B resistant.

"3. Mel B resistance occurs in the French Cameroun under two circumstances: (a) linked to tryparsamide resistance as an inherent character of certain strains of trypanosomes; (b) developed in the organism of infested humans, in the wake of an insufficient treatment with a compound containing the same phenylmelaminyl radical, as Mel B."

[It is regretted that owing to an oversight in routine, an abstract of this paper was not included in an earlier edition of this *Bulletin*.]

APTED, F. I. C. **The Treatment of Advanced Cases of Rhodesian Sleeping Sickness by Mel B and Arsobal.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Sept., v. 47, No. 5, 387-98. [24 refs.]

The first big outbreak of Rhodesian sleeping sickness in Tanganyika began in 1922 near the southern shores of Lake Victoria. Soon the disease spread through the Western and the Lake Provinces of the Territory on both sides of the lake. There were excellent opportunities for examining the therapeutic effect of the drugs then advocated in the treatment of this form of the disease. The consensus of opinion among those treating these patients was that antrypol was quite effective in curing very early cases (of not more than one month's duration) of Rhodesian sleeping sickness; that tryparsimide was much less satisfactory in eradicating the infection at this early stage; and that neither of these drugs would cure advanced cases of the disease. Once the cerebrospinal fluid in patients with this form of human trypanosomiasis developed a protein content in excess of 40 mgm. per 100 ml. there was no hope of its being cured with any of the drugs then employed. Over one-third of those found to be infected with *Trypanosoma rhodesiense* during the last 5 years have died of the infection (1,453 deaths in 3,890 detected cases). The total population of Tanganyika is about 8 million, so the number of detected cases of Rhodesian sleeping sickness has proportionately not been great. Nevertheless, the disease is a constant threat in view of its tendency to epidemic outbreak; and its economic importance is considerable in view of the large areas of tsetse-infected country closed owing to its presence, and of the large staff which has to be maintained to control it.

By 1951 FRIEDHEIM's melaminyl compounds had been shown to be effective in the treatment of all stages of Gambian sleeping sickness, and some of them had proved effective even against tryparsamide-fast strains of *T. gambiense* [this *Bulletin*, 1947, v. 44, 1048; 1948, v. 45, 413; 1949, v. 46, 711 and 919; 1950, v. 47, 449 and 824]. At that time there was agreement that these compounds were too toxic for mass treatment in the field, though they were admitted to be excellent for the treatment of selected hospital cases of Gambian sleeping sickness.

In Tanganyika the Rhodesian sleeping sickness patients are not dealt with *en masse*, but are treated individually at dispensaries or in hospitals; treatment with Friedheim's Mel B was deemed justifiable under such conditions, particularly in view of the tryparsamide-fast character of the causative trypanosome. Accordingly in 1951 a supply of Mel B (and later of Arsobal, its French equivalent) was procured and used in the treatment of 3 groups of hitherto incurable cases of *T. rhodesiense* infection. The dosage of Mel B employed in the treatment of a first group of 8 patients was 1.8 mgm./kgm. body weight (which is half the advocated dosage) over a period of 4 days; after a 2-week interval this course was repeated. A year to 18 months later all but one of these patients were well, with normal or nearly-normal cerebrospinal fluids. The one exception relapsed 6 months after treatment, and died of trypanosomiasis.

A second group of 10 patients was then treated with Arsobal, which its French makers claim to be identical with Friedheim's Mel B; the details of treatment were the same as in the first group for all but 2 patients, who died during treatment, and for a third who was given a course of 3.6 mgm./kgm. body weight. Six to 8 months later all but one of the 8 survivors were well; this one had relapsed after failing to respond immediately to the treatment as satisfactorily as had the other 7 patients. The 2 patients who died during treatment were unconscious or semi-conscious at its start; they were moribund and therefore unlikely to respond to any

therapy. Deaths have previously been recorded when treating patients in a similar state with Mel B; but the author wonders whether, if antrypol had been given first, the "tonic" effect produced by this drug might not have allowed the use of Mel B without the precipitation of the fatal issue. He has put this theory into practice with apparent success in 2 similar cases since.

A third group of 15 patients was treated with a second and different batch of Arsobal in dosages of 1.8 mgm./kgm. once or twice, each over 4-day periods, or of 3.6 mgm./kgm. of body weight over one 4-day period. The follow-up period so far has not exceeded 6 months but the immediate results of treatment have been very similar to those obtained in the first 2 groups. No untoward effects have followed the bigger dosage which was given to 4 patients; a relapse has followed in one of the 8 given the lesser dosage on 2 occasions, and one of the 3 given this same dosage on one occasion also relapsed.

Three other patients, in addition to those in the 3 groups referred to above, have been treated with the bigger dosage (3.6 mgm./kgm. body weight) on 1 or on 2 occasions without serious toxic side-effects, though the patients getting the second course had a rise in temperature of 4° or 5° a few hours after the injections, and some subjective symptoms actually at the time of the injections. Another patient suffered so severely from subjective symptoms (pains in the chest, a feeling of heat, disturbances in smell, and griping abdominal pains) during a second course of injections in the higher level of dosage, that they were given at 48- and not at 24-hour intervals. In all these cases it was only during the second, or repetitive, course of the treatment that the marked symptoms and signs of toxicity occurred.

The author is of opinion that when it is decided to use Mel B (or Arsobal) it is important not to err so much on the side of safety that relapse becomes probable. The danger of the development of Mel B resistance, and the multiplication of such relapse strains, is a very real one and should be obviated as far as is possible. No other drug so far used in the treatment of advanced Rhodesian sleeping sickness has produced results comparable to those obtained with Mel B; its use in such cases is therefore fully justified. In the early stages of Rhodesian sleeping sickness, while antrypol is still effective, this latter is the drug of choice and Mel B should not be used in these cases in view of its possibly lethal toxicity.

[The relevant data are set out in 3 tables, and the details appertaining to the individual patients are given in the text.] A. R. D. Adams

STERCKX, P. Report on Treatment with Arsobal. Secteur d'Usumbura. *Bureau Permanent Inter africain de la Tsé-Tsé et de la Trypanosomiase* No. 201/T. [Léopoldville (Congo Belge).] 7 mimeographed pp. 1953, June 29.

This mimeographed report deals with the effects of treatment of 109 patients [presumably suffering from trypanosomiasis, though the species of parasite is nowhere mentioned] with Arsobal [a French proprietary preparation of Friedheim's Mel B], in Usumbura, Belgian Congo. Its purpose primarily is to record the reactions due to the drug. All the patients had previously been treated unsuccessfully with numerous courses of different trypanocides, their infections were therefore tryparsamide-resistant, and so they had been considered incurable. The immediate recovery rate from the disease following Arsobal treatment appeared to be not less than 75 per cent., as judged on subsequent observation for periods of 6 to 17 months.

The toxic side-effects directly due to the drug were arsenical shock in 5 cases; sudden death in 2; albuminuria in 5; and neuritis, involving the lower limbs, in 5 cases. The arsenical shock rapidly resolved when BAL was given. Of the 2 patients who died when getting the drug, the first was suffering from malarial hyperpyrexia, became comatose, and rapidly died; the other had begun BAL treatment, but fled from hospital and was brought back moribund the next day. The albuminuria which developed in 5 cases was sudden in onset and severe in intensity; in all cases recovery from it was complete. Some of these albuminuric patients were treated with BAL but the others recovered just as quickly without it. The albuminuria usually developed at the start of a second series of injections; on arrest of the Arsobal treatment it rapidly vanished, and the Arsobal treatment could then be resumed without its further recurrence. The neuritis was initiated by diffuse pain in the gemellus muscles [? hip muscles] and on the plantar surfaces, and thereafter was associated with difficulties in walking and Rombergism; it developed slowly and only after the treatment had ended. One patient, having refused further treatment, developed muscular atrophy; the other rapidly got better under intensive treatment with vitamin B₁.

The author reaches the following conclusions:—

“Treatment with Arsobal seemed to be particularly favourable, of a relatively easy use, but it must be effected in a hospital under surgeon’s control.

“This drug is of a rare efficiency and considered statistically it does not lead to a greater number of accidents than other trypanocides if it is used carefully. It deserves not only to retain our close attention for its rare efficiency but, in our opinion, it may have a leading part in the recovery of people suffering from trypanosomiasis.”

Some material data relating to the patients before and after the treatment are set out in a concluding table.

A. R. D. Adams

REFAAT, M. A. & BRAY, R. S.; MAEGRAITH, B. G. **Milk and Protozoal Infections.** [Correspondence.] *Brit. Med. J.* 1953, Nov. 7, 1047-8.

MAEGRAITH *et al.* [this *Bulletin*, 1953, v. 50, 384] reported that rats maintained on a milk diet with the addition of certain vitamins, and infected by blood inoculation with *P. berghei*, were able to suppress or radically cure the infection. Recently a report by KEEPIE [this *Bulletin*, 1954, v. 51, 33] has indicated that the degree of parasitaemia in *T. congolense* infections of mice was influenced by certain diets. This fact has induced the present authors to report some further findings on protozoal infections in animals on a milk diet. The first 2 authors found that a milk diet did not repress *T. rhodesiense* infections in rats. A 2 per cent. casein hydrolysate in 50 per cent. glucose was less effective than pure milk as suppressant in *P. berghei* malaria. The effect of the casein hydrolysate diet was partly reversed by *p*-aminobenzoic acid (PAB) [HAWKING, this *Bulletin*, 1953, v. 50, 1122] and almost completely reversed by a mixture of B vitamins. The suppression of infection by milk appears to the authors to be a complex affair involving a number of factors.

The last-named author writes in the same strain and confirms the findings on *T. rhodesiense* in mice. In his experience only malarial infections were influenced by a milk diet and not those of other protozoa. The effective suppression even of malaria by a milk diet occurred only at certain seasons, probably depending on the cows’ diet and appears to be analogous to the situation occurring in breast-fed infants in certain parts of Africa. While

confirming in part the effect of PAB, from experimental evidence he considers that deficiency of more than one metabolite is probably involved.

J. D. Fulton

DESOWITZ, R. S. & WATSON, H. J. C. **Studies on *Trypanosoma vivax*.**

IV. The Maintenance of a Strain in White Rats without Sheep-Serum Supplement. *Ann. Trop. Med. & Parasit.* 1953, Mar., v. 47, No. 1, 62-7.

In previous papers [this *Bulletin*, 1952, v. 49, 936] the authors reported the successful infection of white rats with *Trypanosoma vivax*, though serial passages could be obtained only if normal sheep serum was also injected into the rat. In the course of further experiments on serum-supplemented passages, control inoculations were made into rats without supplement. When the strain was thus inoculated from the 37th serum-supplemented passage animal, it produced in the control rat a heavy infection. This animal served as the donor from which a new line was started, and has been maintained in rats over 115 passages without supplement. Subsequent isolations from the supplemented line were successfully established in other control rats without addition of sheep serum, until at the 70th passage the original strain became completely independent of the supplement.

In the course of passages through rats both the supplemented and unsupplemented lines underwent changes. The infection was at first of the relapsing type, but subsequently the relapses disappeared, while the virulence of the strain gradually increased and was characterized in the unsupplemented line by high parasitaemia. It would appear that *T. vivax* has reached a high degree of adaptation to rats, but this adaptation is lost if the rat-line is passed through sheep cyclically or mechanically. However, in late direct subpassages the sheep-passaged strain regains its adaptation to rats more easily than in early subpassages.

Both the supplemented and unsupplemented rat-lines of *T. vivax* have retained their power to develop in *Glossina palpalis*.

C. A. Hoare

DIAS, E. Doença de Chagas nas Américas. VII.—Chile. [**Chagas's Disease in the Americas. VII. Chile**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1953, Apr., v. 5, No. 2, 131-6. [51 refs.]

The English summary appended to the paper is as follows:—

"*Triatoma infestans* is the main natural vector of *Schizotrypanum cruzi* in Chile. *T. spinolai*, *T. rubrovaria* and *T. sordida* also occur there.

"44.4 per cent of 20,614 *T. infestans* examined were infected with flagellates.

Besides *S. cruzi*, it is possible that *Trypanosoma rangeli* also exists in Chile.

"Animal reservoirs of *S. cruzi* in the country are: *Canis familiaris*, *Felis domesticus*, *Octodon degus degus*, *Dusicyon griseus griseus* and *Dusicyon culpaeus culpaeus*.

"The geographic distribution of triatomid bugs and human cases of *S. cruzi* infection is recorded.

"At least 2,239 cases have been recognized, from Tarapacá down to Curicó. An estimated 75,000 cases will occur in the endemic regions and, according to Prof. J. Noé, Chagas' disease is probably the most important parasitic disease existing in Chile."

TORREALBA, J. F., with the collaboration of I. RAMOS & B. RICCARDI. Otra nota de enfermedad de Chagas en el Estado Guárico. [**Another Note on Chagas's Disease in Guárico State, Venezuela**] *Gac. Méd. de Caracas*. 1953, Jan.-Feb. & Mar.-Apr., v. 61, Nos. 1/2 & 3/4, 47-66; 109-26. English summary.

The author and his collaborators place on record another 20 cases of Chagas's disease in the State of Guárico and of 4 patients infected by *Trypanosoma rangeli*. A detailed account of the histological examination of the heart of a patient dying, aged 60 years [sex left blank], is given. This showed a diffuse fibroid myocarditis and coronary arteriosclerosis. In a series of tables are given lists of villages in the different municipalities of the State and of the Triatomidae found therein. *Rhodnius prolixus* vastly predominated; *Eutritoma maculata* came next, but was usually much more rare; very occasionally *Panstrongylus geniculatus* was found, and in one municipality *Eratyrus cuspidatus*. An opossum, *Didelphys marsupialis*, and a *Marmosa mitis* were found in nature to be infected with *T. cruzi*. In the municipality of Altagracia de Orituco of 32 specimens of *Rhodnius prolixus* examined, 10 were infected, 5 with *T. rangeli* and the same number with this and *T. cruzi*.

H. Harold Scott

TANG, C. C. **Cultivation of *Trypanosoma cruzi* in Tissue Culture.** *Chinese Med. J. Peking*. 1953, Mar.-Apr., v. 71, No. 2, 115-26, 13 figs. on 2 pls. [24 refs.]

An account is given of the growth of *Trypanosoma cruzi* in hanging drop cultures of heart and spleen tissue from infected young mice, immersed in chick plasma and embryonic tissue juice, and kept at 38°C. Transfers to new medium were made every 3-7 days.

The course of development of *T. cruzi* *in vitro*, which was observed in fresh tissue culture and stained preparations, and in sections of heart, follows the pattern of its cycle in the mammalian host. Within the host-cells the trypanosomes multiplied by repeated binary fission in the leishmanial stage, the resulting individuals assumed the trypanosome form and escaped into the surrounding fluid. Later they penetrated into the proliferating host cells, where they again became rounded, and the cycle was resumed. The development is thus from trypanosome to leishmania and back, without an intermediate crithidial stage. This cycle was confirmed by growing infected and normal pieces of mouse heart tissue in the same preparation: it was shown that trypanosomes emerging from infected cells invaded the non-infected ones. Similar results were obtained when infected mouse tissue was cultivated together with normal embryonic chick heart, but growth in the latter was of shorter duration. The author believes that in its mammalian host the trypanosomes may invade new cells *in situ*, without necessarily having to enter the blood, as is generally thought.

In order to ascertain whether crithidial forms are capable of developing in heart tissue, NNN cultures of *T. cruzi* were inoculated in hanging drop tissue cultures, some of which were kept at room temperature, and others at 38°C. No growth was observed in the former and in the majority of the latter cultures, but in some of these the flagellates penetrated into the host-cells and ultimately gave rise to typical blood trypanosomes. The author rightly suspects that in these cases, in addition to crithidia, other stages, *viz.*, metacyclic trypanosomes, must have been present in the inoculum.

The cells invaded by *T. cruzi* in tissue culture were macrophages,

epithelioid cells and fibroblasts, which may react by vacuolization, hyperchromatosis and hypertrophy. Phagocytosis of the flagellates was observed in spleen cultures.

C. A. Hoare

Prizzi P., T. Sobre el problema de las formas delgadas de "Trypanosoma cruzi". (Comunicación preliminar.) [**The Problem of Slender Forms of *T. cruzi***] *Bol. Informaciones Parasitarias Chilenas*. 1953, Apr.-June, v. 8, No. 2, 26-30. [11 refs.]

The English summary appended to the paper is as follows:—

"Experimental studies in mice and rats, including detailed quantitative analysis of the parasitemia curves, correlated with the tissue cycle of the parasite, tended to substantiate the hypothesis that slender forms of *T. cruzi* are actually young stages of the parasite. It was also shown, that these forms disappeared from the peripheral blood in any circumstance in which a certain degree of acquired immunity has developed in the host, in spite of the fact that adult forms may persist in circulation."

CORRÊA, R. R. DA SILVA, T. L. & RAMOS, A. da S. Os triatomíneos vectores da moléstia de Chagas no Estado de São Paulo, Brasil. [**Triatomid Vectors of Chagas's Disease in São Paulo, Brazil**] *Arquivos de Hig. e Saúde Pública*. S. Paulo. 1952, Dec., v. 17, No. 54, 535-46, 1 folding map. [11 refs.] English summary.

PICK, F. Sur la cristallisation spontanée "in vitro" de l'oxyhémoglobine du sang de pigeon, ingéré par des triatomes. [**Spontaneous Crystallization in vitro of Oxyhaemoglobin from Pigeons' Blood, Ingested by Triatomids**] *Ann. Parasit. Humaine et Comparée*. 1953, v. 28, No. 3, 227-34, 5 figs.

New observations are presented to show the possibility of preparing crystalline oxyhaemoglobin of blood spontaneously *in vitro*, with pigeon blood which crystallizes easily and abundantly in the midgut of triatomid bugs. The crystals formed are fully described in regard to their configuration, measurement and colour.

Biological crystallization in the midgut of triatomids occurred in successive stages, and led finally to the co-existence of crystals of very different shapes but which always conformed to the crystalline configurations characteristic of oxyhaemoglobin. Heaping and piling of crystals and the limiting factors operating are discussed. Experiments carried out on the blood of animals susceptible to *Trypanosoma cruzi* have shown that the biological crystallization of oxyhaemoglobin of ingested blood is independent of trypanosomal infection.

Continuation of oxyhaemoglobin crystallization of withdrawn blood was observed in completely sealed preparations in the laboratory, and the question of regular spontaneous crystallization *in vitro* was considered. Preparations of blood were limited to temporarily incomplete inclusions digested by triatomids. In the first series use was made of pigeon blood ingested by *Triatoma infestans* and withdrawn from the insect *before* the onset of biological crystallization of its oxyhaemoglobin. Examination after 3 months revealed a crystalline network extending across the entire preparation. The networks are described in detail and reference is made to their centres of crystallization. In the second series, blood ingested by *T. infestans* was withdrawn from the insect *at the beginning* of biological

crystallization of its oxyhaemoglobin. In this case the total amount of blood withdrawn did not reveal more than 3 crystals of oxyhaemoglobin. The largest of these was placed in a sealed tube with an appropriate amount of blood. No further crystallization took place for 3 weeks, when abundant crystallization in a fan-like arrangement was observed.

With regard to the investigations into the crystallization of oxyhaemoglobin in the blood of animals susceptible to *Trypanosoma cruzi*, it was revealed that spontaneous crystallization *in vitro* is independent of the eventual infection of triatomids, but specific to the origin of the ingested blood. The particular interest of spontaneous crystallization of oxyhaemoglobin of blood ingested by triatomids *in vitro* resides in the fact that it can occur in bloods either not crystallizable or crystallized with difficulty by biological methods.

This demonstration, applied, for example, to the epidemiological picture of Chagas's disease, increases the possibility of recognizing the origin of blood without having recourse to precipitating sera. J. S. Harington

UNTI, O., DA SILVA, T. L. & DE AGUIAR, A. A. Alguns dados sobre a reação de Machado & Guerreiro na infância. [**The Machado-Guerreiro Reaction in Young Children**] *Arquivos de Hig. e Saúde Pública*. S. Paulo. 1952, Dec., v. 17, No. 54, 529-34. English summary.

The authors have examined by the Machado-Guerreiro complement-fixation test the blood of 16,919 persons in 61 municipalities of São Paulo and among these were 2,210 from children under 10 years old. Of these, 1,755 (79.4 per cent.) were negative, 144 were doubtful (6.5) and 311 (14.0) gave degrees of positive from 1 to 4 *plus*. Of the 311, there were 128 (41.1) giving a 1-*plus*, 118 (37.9) a 2-*plus*, 47 (15.1) 3-*plus*, and 18 (5.8) 4-*plus*. In view of the varying sensitivity of the culture antigen, the authors advise regarding all below 2-*plus* as suspicious but not proven.

Many of the people live in dark, badly constructed dwellings, heavily infested with Triatomidae and in the earliest months of life lie exposed to bites from these; hence the relatively heavy infection of the very young. H. Harold Scott

SCHENONE F., H., DONCKASTER R., R., MORALES V., Inés & PIZZI P., T. Forma aguda de Enfermedad de Chagas en un adulto. [**Acute Form of Chagas's Disease in an Adult**] *Bol. Informaciones Parasitarias Chilenas*. 1953, Apr.-June, v. 8, No. 2, 33-5.

CHRISTEN A., R. & ATÍAS M., V. A. Ensayos de Quimioterapia de la Enfermedad de Chagas experimental. XI. Acción del Difosfato de Isopentaquina, solo y asociado al Sulfato de Quinina. [**Chemotherapeutic Trials in Experimental Chagas's Disease. XI. Action of Isopentaquine Diphosphate Alone and With Quinine Sulphate**] *Bol. Informaciones Parasitarias Chilenas*. 1953, Apr.-June, v. 8, No. 2, 30-33.

The English summary appended to the paper is as follows:—

1. Isopentaquine allowed a longer survival, with low parasitemias of mice experimentally infected with *Trypanosoma cruzi*.
2. When Isopentaquine was used associated with quinine sulfate, the action is greater, and 100% of the mice survived, without parasites in circulation.

"3. This effect is probably explained by the property of quinine-sulfate of maintaining higher levels of isopentaquine and not through a direct action against the trypanosomes."

LEISHMANIASIS

HEISCH, R. B. **Epidemiology of Kala-Azar.** *East African Med. J.* 1953, July, v. 30, No. 7, 267-8.

A "violent outbreak" of kala azar has occurred in the Kitui District of Kenya. The investigations reported were carried out during a 4-day visit to the area of the outbreak. Specimens of *Phlebotomus clydei*, *P. schwetzi* and *P. kirki* were collected near a water hole; single specimens of the first 2 species contained flagellates believed to be from lizards. Africans acting as a "bait" were not bitten by sandflies.

In and near huts in infected villages, *P. clydei* was the prominent species entering the huts: in addition to the 3 species already mentioned *P. bedfordi* and *P. bedfordi* var. *congolensis* were found. One specimen of the last-named contained flagellates "mostly crithidial". *P. clydei* was also found in rodent burrows and in termite-hill chimneys near villages.

P. orientalis, a species suspected as a vector in the Sudan and known to occur in East Africa, was not found. *P. clydei* is not a member of the major group of sandflies to which all the known vectors of kala azar in the Old World belong, and there was no evidence that it bit man. The author suggests that he may have visited this district during the non-transmission season. [He does not, however, state the date of his visit.] *L. E. Napier*

FENDALL, N. R. E. **The History and Character of the Kala-Azar Outbreak in the Kitui District.** *East African Med. J.* 1953, July, v. 30, No. 7, 269-85, 1 map & 7 figs. [16 refs.]

This paper is a summary of a long paper that appeared in the *J. Trop. Med. & Hyg.*, 1952, v. 55, 193, 220 and 245 [see this *Bulletin*, 1953, v. 50, 496]. No new facts appear to have been added. It is a point of interest that the original paper is nowhere referred to. *L. E. Napier*

CARSWELL, J. **Kala-Azar at Kitui.** *East African Med. J.* 1953, July, v. 30, No. 7, 287-93, 1 map.

Kitui district in Kenya has an area of 12,000 square miles and an approximate population of 210,000; the majority of the people live in the elevated (1,700 to 2,500 feet) central region. A few cases of kala azar from several locations were reported in 1951. There was evidence of a slight increase in the number of cases from March, 1952, but in October a report came from Tseikuru dispensary that there were many cases there; 76 were seen. The diagnosis was not by spleen puncture. [But it is not stated on what it was made.]

Emergency hospitals were built at Tseikuru and Mivukoni dispensaries. At first most cases came from Tseikuru location but later many came from Mivukoni. Up to the end of December, 223 patients diagnosed as suffering from kala azar were treated at these two dispensaries and 80 were treated at Kitui, making a total of 303 cases in 1952. During the first 3 months in

1953, 468 cases of the disease were admitted to the two emergency hospitals and another 95 to the Kitui hospital. In all the locations where kala azar has been reported, except Mutha, there has been a considerable increase in reported cases. The disease appeared to spread in an orderly fashion from north to south. At present there does not appear to be much transmission of the disease in Tseikuru location where the "epidemic" first started.

Apathy was a most striking clinical characteristic. [This is not the case with kala azar in India.] Emaciation was usually marked, as also was cough and glandular enlargement. The spleen was usually grossly enlarged. Anaemia was constant; it was usually hypochromic and macrocytic.

Spleen puncture was done at the beginning of the epidemic, however, the diagnosis was apparently mainly clinical, supported by a positive aldehyde test and leucopenia. [The author ends the paragraph on diagnosis by this statement: "The aldehyde test is usually positive and spleen puncture will usually clinch the matter." It probably would, but was it done?]

For treatment, pentamidine isethionate and urea stibamine were the drugs mainly used; the author adds "*Pentostam* is still under trial". [Presumably he means in Kenya; the reviewer used this drug—under another name—nearly 20 years ago and it has been in use more or less continuously since.] At first, two 10-day courses of pentamidine followed by two 20-day courses of urea stibamine with 7 days' interval between courses were given, but later a single course of each drug was used; no figures are given. The author remarks with reference to pentamidine that "in several instances it has produced hypoglycaemic coma".

[It does not seem certain to the reviewer, who has admittedly had no experience of the local conditions but a considerable experience of the disease elsewhere, that there was in fact a sharp "epidemic" of kala azar. There has probably been an increase of the disease in recent years, a fact to which FENDALL drew attention in 1952 [see above]. Increased awareness of the disease among doctors resulting in its diagnosis and successful treatment, news of which spread among the populations, might well produce the result that is reported. There were apparently few acute cases, whereas under epidemic conditions the proportion of such cases is usually fairly high.]

L. E. Napier

SEN GUPTA, P. C., RAO, S. S., LAHIRI, D. C. & BHATTACHARYYA, B.
Electrophoretic Pattern of Kala-Azar Serum. *J. Indian Med. Ass.*
1953, Aug., v. 22, No. 11, 433-5, 10 figs. on pl.

The serum tests for kala azar depend on the changes that occur in the albumin/globulin ratio and on the increase in the euglobulin fraction. The changes are also responsible in some way for the high anticomplementary incidence among kala-azar sera, 16 per cent. of which are anticomplementary to a considerable degree [this *Bulletin*, 1953, v. 50, 498]. A few electrophoretic studies of kala-azar serum have been carried out in the past; these showed a marked increase in the γ -globulin. The authors have undertaken a study of the electrophoretic patterns in 9 cases of kala azar and compared the findings with those of the serum tests in the same patients. All 9 sera showed the same γ -globulin peak. The aldehyde and antimony tests were positive in 3 and 4 cases, respectively, but negative or doubtful in the rest. The modified WKK complement-fixation test was positive in all 9 cases.

Hyperimmune serum shows a γ -globulin that moves much more slowly than the normal γ -globulin; this is known as γ_2 -globulin. The electrophoretic patterns of these kala-azar sera showed an even more slowly

moving γ -globulin. The authors did not, however, confirm the finding of a rapidly-moving albumin fraction, faster than the normal albumin, which BENHAMOU *et al.* [this *Bulletin*, 1950, v. 47, 830] claim is characteristic of early kala azar.

This extremely slow-moving γ -globulin appears to be characteristic of kala azar; it remains to be shown whether it ever occurs in other diseases.

L. E. Napier

DEY, N. C. & KUAR, B. K. **Dermal Leishmanoid in Assam.** *J. Indian Med. Ass.* 1953, Aug., v. 22, No. 11, 456-61, 4 figs. on pl. [16 refs.]

In reporting 10 cases of post-kala-azar dermal leishmaniasis, the authors take the opportunity of introducing a good general description of this dermal phase of visceral leishmaniasis. They point out that hitherto few cases have been reported from Assam. They also reiterate the suggestion that this phase is an example of partial host-parasite adjustment. They believe that there are many cases of this condition in Assam but that patients do not seek treatment.

Of the 10 patients, 8 had had previous treatment for kala azar and the other 2 gave no clear history of it. In one treatment had been by stilbamidine. Leishmaniae were found in 8 cases and the other 2 were clinically typical. In 3 cases nodules were found on the tongue; as this lesion has not been reported very frequently the authors suggest that it may be more common in Assam than elsewhere. The histopathology in one case was studied; the patient had had 15 injections of urea stibamine. Thinning of the epidermis, oedema of the sub-papillary layer, granulomatous areas in compact masses separated by fibrous tissue, and atypical giant cells with only a single nucleus were reported.

The authors' remarks on treatment were general and did not appear to refer to their own cases; they noted that 50 injections of some antimony preparation were usually necessary and that nicotinic acid sometimes may "cut short the course of treatment".

In a footnote the authors state that they have subsequently encountered 3 more cases.

[While it is extremely probable that there were a certain number of unreported cases of post-kala-azar dermal leishmaniasis in Assam during the 2 decades between 1925 and 1945—a period during which the disease was so common in Bengal that at one clinic in Calcutta as many as 100 fresh cases were reported in a year—only a very few cases were actually reported from Assam. There is evidence that kala azar has invaded Upper Assam only in relatively recent years; is it not possible that this partial host-parasite adjustment, which was suggested from observations in the older endemic areas of Bengal and Madras, is now becoming apparent in Assam, and that the recent increase in post-kala-azar dermal leishmaniasis in Assam is not apparent but real?]

L. E. Napier

BIAGI F., F. Algunos comentarios sobre las leishmaniasis y sus agentes etiológicos. *Leishmania trópica Mexicana*, nueva subespecie. [On **Leishmaniasis and their Causes.** *Leishmania tropica mexicana*, a new Subspecies] *Medicina*. Mexico. 1953, Sept. 10, v. 33, No. 683, 401-6. [56 refs.]

The author speaks first of *L. donovani*, *L. tropica* and *L. brasiliensis* and their vectors *Phlebotomus papatasi* and *P. sergenti* and, in China, *P. chinensis*. Next, of the visceral leishmaniasis conveyed by *P. chinensis*

and *P. sergenti* in China, *P. argentipes* in India, *P. perniciosus* and *P. major* in the Mediterranean, *P. orientalis* in the Sudan, *P. intermedius* and *P. longipalpis* in America. He goes on to speak of the cutaneous forms, the *Botón de Oriente* with its tendency to spontaneous cure and not to metastases, the Brazilian form with more or less extensive ulcerous lesions involving skin and mucosae, destructive and tending to metastasis and chronicity. He now proposes to name a new subspecies *L. tropica mexicana* which attacks especially the ear, as a rule avoiding the mucosae, leading to but little destruction of tissue and not producing metastases, tending to spontaneous cure in a few months leaving a small dyschromic cicatrix and apparently confined to south-east Mexico, Guatemala and Belize.

In an addendum the author refers to a recent paper by FLOCH and SUREAU in French Guiana who described a condition similar to the *uta* of Peru and its difference from the muco-cutaneous leishmaniasis of Brazil (*Arch. Inst. Pasteur, Guyane*, No. 275, Nov., 1952). H. Harold Scott

BIAGI F., F. Notas terapéuticas sobre la leishmaniasis tegumentaria mexicana, (úlceras de los chicleiros). [**The Treatment of Mexican Cutaneous Leishmaniasis (Chicle Ulcer)**] *Medicina*. Mexico. 1953, Sept. 25, v. 33, No. 684, 435-8. [10 refs.]

The author records his experience in the treatment of chicle ulcer with various drugs. He prefaces his researches with a few general statements that when the lesion is not on the ear—a very common site—cure takes place spontaneously in a short time, about 3 months, or, with merely keeping the lesion clean and injection of antimonials, in about a week. Lesions of the ear, however, rarely tend to spontaneous cure, but may continue for years if left untreated. An important factor, also, is the length of time the disease has been in existence in any particular case. If only for a few weeks or months, proper treatment will succeed in 10 days or so; if for some years, 30 days, and in either case treatment should be kept up for 3 to 10 days after "clinical cure", and the patient should be under observation for any signs of relapse which may occur within a year—this is usually due to inadequate treatment—or even 4 years after apparent cure.

The specific drugs used were: (i) *Tartar emetic*. Ampoules of 5 cc. were used, containing 0.1 gm. of the salt. This dose was injected intravenously on alternate days for 10 injections, repeated after an interval of 10 days. In case there is any idiosyncrasy the first dose may be 1-2 cc. instead of the full 5 cc. The results are generally satisfactory, but signs of intolerance may appear—sweating, salivation, vomiting and myalgia. These symptoms usually clear up in half an hour or so and are less likely to occur if the injection is given slowly. One patient had a transient syncopal attack, but this had followed the use of atabrin [mepacrine] and Repodral. (ii) *Fuadin* or *Repodral*, in the same dosage as the tartar emetic, but intramuscularly; each ampoule contains 0.315 gm. (iii) *Glucantime* was used for a patient with a vegetating lesion of the ear of 11 years' evolution and progressing. Of this drug 10 cc. (2 ampoules, 0.3 gm.) were injected intramuscularly each day for a week, repeated after a fortnight's interval during which the patient was away. There was no sign of intolerance and the size of the injection did not cause any upset. The author regards this as the "treatment of choice". (iv) *Lomidine* gave good results but was liable to cause toxic reaction. It was used for a patient with ulcerating subcutaneous nodules of the ear, of 8 years' evolution; he had proved intolerant of tartar emetic (attacks of coughing), and Repodral (arthralgia and myalgia). Injections

were given intramuscularly each day, 4 of 1.5 cc. and 2 of 3 cc. (each ampoule of 3 cc. = 0.12 gm. of the drug) and a few days later another injection of 3 cc. After the injection the patient was made to rest and not expose himself to the sun's rays. It is suggested that lomidine should be used for those who do not tolerate antimonials or in whom these are not effective. (v) Lastly, *Avlosulphone* (diamino-diphenyl sulphone). This was tried in doses of 2 tablets daily for 3 consecutive weeks (each tablet = 0.1 gm. of the drug) to 3 patients with ulcerating subcutaneous nodules of the ear which had existed for 7, 8 and 15 years respectively. In none was there any improvement and the author regards this drug as useless.

H. Harold Scott

BLANC, G. & BRUNEAU, J. Contribution à l'étude expérimentale de la leishmaniose spontanée du cobaye. [Experimental Study of Spontaneous Leishmaniasis in Guinea-pigs] *Arch. Inst. Pasteur du Maroc*. 1953, v. 4, No. 6, 405-10, 4 figs. on 2 pls. [Refs. in footnotes.]

[See also this *Bulletin*, 1948, v. 45, 776.]

FEVERS OF THE TYPHUS GROUP

KITAOKA, M. & TAKANO, K. **Comparative Study on Complement Fixation Technics in Rickettsial Diseases.** *Japanese J. Med. Sci. & Biol.* 1953, Apr., v. 6, No. 2, 119-29, 2 figs. [24 refs.]

Eleven modifications of the complement-fixation test were tried with antigens prepared from the Breinl strain of *Rickettsia prowazeki* and the Wilmington strain of *R. mooseri* which the authors describe under the recently proposed name *R. typhi*. The object of the study was to find the most sensitive method consistent with specificity. Among the methods tested were the American Army Medical School method, a modified Kolmer test, a modified Bengtson technique and a method devised by the authors who claim it to be the "most feasible method on the standpoint of sensitivity as well as specificity". It is admitted, however, that the trials were directed specially to sensitivity, and only 2 strains of antigen were used. The paper will appeal specially to serologists who are sure to welcome this sign of renewal of interest in the search for improved serological tests for the rickettsial diseases.

John W. D. Megaw

MORLAN, H. B.; UTTERBACK, Bernice C.; DENT, J. E.; WILCOMB, M. J., Jr.; GRIFFITH, M. E.; ELLIS, L. L. **Domestic Rats, Rat Ectoparasites and Typhus Control. Part I. Domestic Rats in relation to Murine Typhus Control** [MORLAN, UTTERBACK & DENT]. *Pub. Health Service Publication*, No. 209. *Pub. Health Monograph* No. 5. Wash. 1952, Nov., 1-20, 3 figs. [19 refs.] **Part II. Ectoparasites of Domestic Rats in relation to Murine Typhus** [MORLAN & UTTERBACK]. *Ibid.*, 21-30, 1 fig. **Part III. Commensal Rat Ectoparasite Collections in Oklahoma** [WILCOMB, GRIFFITH & ELLIS]. *Ibid.*, 31-7.

This monograph in 3 parts, and by 6 authors, contains a comprehensive and critical summary of recent studies in the U.S.A. of domestic rats and their ectoparasites, with special reference to the problem of murine-typhus control. In North America the name typhus when used without qualification

is frequently regarded as synonymous with murine typhus; this usage has been followed in the title of the present monograph.

The first part of the monograph contains a great deal of information on rat ecology and the prevalence of murine-typhus antibodies in rats by species, sex and age in Georgia where a thorough study of murine typhus and an experiment in the county-wide control of the disease were carried out from the autumn of 1945 onwards [see this *Bulletin*, 1951, v. 48, 976 and 1952, v. 49, 34]. Detailed figures are given of the numbers and percentages of domestic rats found positive to the complement-fixation test in each of the 3 years 1946 to 1949 in the two counties in which an attempt was made to control the flea population by dusting with 10 per cent. DDT, and in a control county. The most important piece of fresh information now given is that by the second year after discontinuance of the dusting operations murine typhus antibody prevalence was not significantly different in young rats from treated and untreated areas.

The second part of the monograph deals in a similar way with the findings in a survey of 20,000 domestic rats from the point of view of their ectoparasites. Here again the authors' comments on the effect of the dusting campaign are not entirely optimistic; they state that excellent county-wide control of *Xenopsylla cheopis* was obtained with a surprising degree of residual effectiveness so that additional efforts could be expected to eradicate typhus, at least in localized areas, but the economic feasibility of an eradication campaign remains to be proved.

The third part deals with a survey of the ectoparasites found on 1,051 commensal rats and of murine typhus in Oklahoma during a period of 19 months from November 1949. Among the 675 rats examined only 20 had positive complement-fixation reactions for murine typhus and all but 2 of these were caught in establishments where human and animal food was handled. Among the positive rats the average number of *X. cheopis* was about 6. During the 10 years from 1939 onwards 28 cases of murine typhus were reported to the Oklahoma State Health Department. [There is a notice at the end of the monograph that single copies of most Public Health Monographs are available upon request to the Public Inquiries Branch, U.S. Public Health Service, Washington 25 D.C.] *John W. D. Megaw*

NORMAN, J. P. Scrub Typhus with special reference to a Yearly Outbreak occurring on Cherideo T. E. *Proc. Ann. General Meeting of Assam Branch Brit. Med. Ass., Cinnamara, 12th-15th March, 1953.* 17-22. 1953. Calcutta: Indian Tea Association.

In the Cherideo Tea Estate in Assam 23 cases of scrub typhus with 11 deaths occurred in the months of December, January and February, 1949-1950. In the following year at the same season 14 cases occurred with 4 deaths. Again, in December, 1951, there were 4 cases and then, for the first time, the illness was suspected of being a typhus-group fever and all the patients were found to have agglutination reactions with *Proteus OXX* at titres of 1 in 250 to 1 in 375. Up to the time of writing there have been 57 cases with a fatality rate of 42 per cent. among the patients who were not treated with chloramphenicol, and no death among those treated with this drug. Fifty-two of the patients were male adults, the others were 3 women and 2 children. The unusual seasonal distribution was not explained but it was suspected that infection was associated with some seasonal occupation which necessitated entry to the infected area during the cold and dry months of the year.

John W. D. Megaw

WEYER, F. Künstliche Infektion der Kleiderlaus mit *Rickettsia tsutsugamushi*. [Artificial Infection of the Body Louse with *Rickettsia tsutsugamushi*] *Ztschr. f. Hyg. u. Infektionskr.* 1953, v. 137, No. 4, 419-28, 2 figs.

The author has already shown that the rickettsiae of the tick typhus fever group (*Rickettsia rickettsi* and *R. conori*), as well as *R. akari* and *R. burneti*, can readily be cultivated in the body louse by intrarectal and intra-coelomic inoculation [this *Bulletin*, 1953, v. 50, 22, 102, 499]. Using similar technical methods he has now found that the body louse is not a suitable host for *R. tsutsugamushi*. After intrarectal inoculation there is no multiplication of the rickettsiae in the intestine of the louse. After intracoelomic inoculation rickettsiae multiply slightly in the haemolymphatic fluid but to a much less degree than is the case with the other rickettsiae, although it was possible to maintain growth for 4 such passages during a period of a month, by the end of which multiplication ceased and no further passage was possible. So long as the rickettsiae can be detected in the coelomic fluid they retain their virulence and pathogenicity for mice. In the coelom of larvae of the meal beetle or of ticks (*Ornithodoros moubata*) no multiplication occurred. Compared with the other pathogenic rickettsiae *R. tsutsugamushi* shows a high degree of selective host specificity and a poor capacity for passage through the body louse. In nature also the organism shows strict host specificity, the only known vector being a trombiculid mite.

John W. D. Megaw

PAYZIN, S. Epidemiological Investigations on Q Fever in Turkey. *Bull. World Health Organization*. Geneva. 1953, v. 9, No. 4, 553-8, 1 fig. [17 refs.]

This is a summary of the reports that have hitherto been made of investigations into Q fever in Turkey where the presence of the disease was first discovered 5 years ago by the author. The distribution is widespread all over Turkey, among human beings, sheep, cattle, goats and buffaloes. In complement-fixation tests of 127 human sera at the venereal diseases laboratory 7 samples were positive at a titre of 1 in 10 and 7 at 1 in 20 to 1 in 40. In tests of 1,590 sera from cases of pneumonia 357 were positive at titres of 1 in 10 to 1 in 320 or over. Among 1,008 animals, 149 were positive at titres of 1 in 10 to 1 in 160: the percentages of positive reactions in the various animals were: sheep, 16.5; goats, 13; cows, 16; and buffaloes, 4. Of 4 dogs tested 3 were positive.

Many strains of *Coxiella* [*Rickettsia*] *burneti* have been isolated by the author and tested by him as well as by Dr. D. B. LACKMAN at the Rocky Mountain Laboratory. They were not found to differ in any important respect from strains in other parts of the world, though some of them "were found to have poor antigenicity".

In human cases the symptoms were those of atypical pneumonia. Typhus-like or measles-like rashes occurred in "some cases" and gave rise to errors in diagnosis. Nearly all the cases examined by radiology showed evidence of lung changes. In goats experimentally inoculated with the disease there was slight fever and cough lasting about a week.

Good results in the treatment of human cases were obtained with chlor-ampenicol, aureomycin and oxytetracycline (the non-proprietary name of terramycin). [See also this *Bulletin*, 1949, v. 46, 352; 1950, v. 47, 129; 1951, v. 48, 30; 1953, v. 50, 103.]

John W. D. Megaw

LUOTO, L. **A Capillary Agglutination Test for Bovine Q Fever.** *J. Immunology.* 1953, Oct., v. 71, No. 4, 226-31, 2 figs.

The author describes a capillary agglutination test for Q fever in cattle; he claims that it has a high degree of simplicity, rapidity and reliability. The antigen is prepared from a yolk-sac culture of *Coxiella* [*Rickettsia*] *burneti* which is purified with ether, differentially centrifuged and stained with a modified Harris haemotoxylin stain. The method of preparation is described in detail; it is too complicated for routine use in ordinary laboratories, but stock preparations are said to keep indefinitely when lyophilized or stored at 4°C. The capillary tubes are about 9 cm. long and have an internal bore of 0.4 mm.; one-third of each tube is filled with antigen suspension by capillary action; the remainder is filled in the same way with the serum to be tested, either whole or in serial dilutions. The end point is easy to read. Large numbers of comparative trials were made in which the test was found more sensitive than the complement-fixation reaction and also less likely to give non-specific responses. The result was regarded as positive even with undiluted serum; the fixation test was assumed to be positive at titres of 1 in 16 or more.

With both tests no positive results were found among 373 cattle from uninfected herds or among 101 cattle infected with encephalitis, leptospirosis or brucellosis. Negative results were also found in 23 guineapigs experimentally infected with epidemic typhus, endemic typhus, rickettsialpox, Indian tick typhus, psittacosis or tularemia. Among 936 cows from herds infected with Q fever 410 were positive with the agglutination test and of these 146 gave negative reactions with the fixation test. The number positive with the fixation test was 284 and of these only 20 were negative with the agglutination test. In tests of 533 cows from infected herds 522 agreed in giving positive or negative results with both tests, and in a series of 166 positive sera, in which the end points were carefully estimated, the titres in 90 per cent. of the cases were either the same or differed only by one step in the scale of titres. The test is said to become positive in cattle soon after infection and to remain positive for considerable periods after the fixation test has become negative.

[These findings are of great interest; it is to be hoped that other workers will undertake studies of the problem of finding a simple and reliable test for Q fever which can be made available for general use.]

John W. D. Megaw

YELLOW FEVER

WORLD HEALTH ORGANIZATION: **Arrangements for the Issue of International Certificates of Vaccination against Yellow Fever** (Situation as on 30 October, 1953). Suppl. to *Weekly Epidem. Record, R.E.H. No. 357*. 1953, Oct. 30, 24 pp. [1953/Supp./No. 2.] [This summary appears also in *Bulletin of Hygiene*. 1954, v. 29, 128.]

The contents of this publication are presented in five parts.

Part I. *Centres designated by health administrations for the issue of valid certificates of vaccination against yellow fever.*

This part lists the centres notified to WHO up to August 31st, 1953, by national health administrations, as having been designated by them to carry out vaccinations against yellow fever and to issue international certificates

of such vaccinations. These certificates are valid only if the vaccine used has been approved by WHO and if the vaccinating centre has been designated by the health administration for the territory in which that centre is situated. If these conditions are fulfilled, the validity of the certificates issued is for a period of 6 years, beginning 10 days after the date of vaccination or, in the case of a revaccination within such period of 6 years, from the date of that revaccination. The lists now provided indicate the locations of over 850 centres, at which facilities exist for vaccination against yellow fever and for the issue of the corresponding international certificates.

Part II. *Yellow fever vaccines approved by WHO.*

Under this heading are given the names and locations of the several laboratories or institutes, whose vaccines have been approved by WHO for vaccination against yellow fever prior to the issue of international certificates of such vaccination. In this connexion it is noted that although two of these laboratories—the Rocky Mountain Laboratory (N.I.H.), Hamilton, Montana, and the laboratories of the I.H.D., Rockefeller Foundation, New York—have discontinued the production of yellow fever vaccine, stocks of that vaccine prepared at these laboratories may still be used for the relevant vaccination and certification. [WHO approval of a yellow fever vaccine is granted only after submission, by a manufacturing laboratory seeking such approval, of samples of its vaccine for international test by 3 independent laboratories selected by WHO, and after the favourable recommendation made by members of the WHO Expert Advisory Panel on Yellow Fever, to whom the results of the tests have been communicated, has been endorsed by the Executive Board of WHO.]

Part III. *Yellow Fever vaccine testing stations.*

The names and locations of the 14 laboratories or institutes, which have been designated by WHO as approved for testing the activity of yellow fever immunizing vaccines, are given in this part. From among these laboratories or institutes are selected the 3 control laboratories to which, for the purpose of international testing, representative samples must be submitted by any laboratory applying for WHO approval of the yellow fever vaccine it produces. [In this connexion UNRRA, under the provisions of Article XI (10) of the International Sanitary Convention for Aerial Navigation, 1944, laid down standards with which yellow fever vaccine had to conform. These standards, later adopted by WHO, prescribe, in so far as potency is concerned, that, with respect to 17D yellow fever virus vaccine, the finished, dried, chick-embryo pulp, when rehydrated to its original volume, shall contain not less than 150,000 MLD (mouse-units) of virus per millilitre of vaccine at the time of passing final potency test and that, for the satisfactory immunization of man, not less than 500 MLD of active virus shall be contained in the immunizing dose injected, an excess being preferred. In regard to Dakar mouse-adapted virus vaccine, which is applied by scarification of the skin and of which but a fraction of the virus contained in the individual dose thus applied is absorbed, the immunizing dose has a virus content of not less than 5,000 MLD.]

Part IV. *International certificates of immunity against yellow fever.*

In the list given in this part are named the laboratories and institutes which were approved by WHO for the issue of international certificates of immunity against yellow fever, under the terms of the footnote to the International Certificate of Immunity annexed to the 1944 International

Sanitary Convention. Although this type of certificate is not included in the International Sanitary Regulations, such a document may be accepted as valid by national health administrations if issued by any of the three laboratories or institutes named in the list before the entry into force of the Regulations on October 1st, 1952.

Part V. *Index of countries.*

In this index appear, in alphabetical order and with appropriate page reference, the names of the 117 countries or territories, among which are distributed the 855 vaccinating centres listed in Part I. *G. Stuart*

KIRK, R. & HASEEB, M. A. **Animals and Yellow Fever Infection in the Anglo-Egyptian Sudan.** *Ann. Trop. Med. & Parasit.* 1953, Oct., v. 47, No. 3, 225-31. [30 refs.]

This paper represents a summary of tests for yellow fever antibody on the sera of wild and domestic animals which have been collected in the Anglo-Egyptian Sudan and have apparently been tested by various investigators. The results show that with the exception of 2 of 19 monkeys from Fung, east of the West Nile, and 1 of 4 hyraxes from the Nuba Mountains, all other sera from wild animals were negative. [The numbers of other samples (with the exception of bush babies, of which there were 10 negative specimens) were from 1-5 specimens.] Some notes on some of the animals involved in the surveys are presented.

"Immune bodies" were found in the sera of certain domestic animals. Thus 9 of 59 cows, 2 of 19 sheep, 3 of 11 pigs and 2 of 5 dogs were regarded as having "immune bodies to yellow fever". Kirk and Haseeb note that FINDLAY and his colleagues [this *Bulletin*, 1936, v. 33, 339] found immune bodies in the sera of domestic animals from areas where yellow fever does not occur and note the presence of non-specific virus neutralizing substances in the blood of some animals. [There is no indication whether these tests on the sera of domestic animals are from previously reported results, whether or not the sera were inactivated by heat, or how much virus was used in the tests.] *G. W. A. Dick*

VARGAS-MENDEZ, O. & ELTON, N. W. **Naturally acquired Yellow Fever in Wild Monkeys of Costa Rica.** *Amer. J. Trop. Med. & Hyg.* 1953, Sept., v. 2, No. 5, 850-63, 9 figs. (8 on 2 pls.). [22 refs.]

There is a considerable amount of evidence that in South America many deaths have occurred in the monkey population during sylvan outbreaks of yellow fever. However, with one exception the evidence has been presumptive and not based on pathological findings. While the Panama wave of yellow fever was passing through Costa Rica the people were requested to report the localities where dead monkeys were noted. This resulted in autopsy material being obtained in Costa Rica from 35 dead, dying or sick monkeys. In 24 of them the livers exhibited the typical liver lesions of yellow fever. Most of these diagnoses are based on typical microscopic patterns; a few are based on the scattered distribution of remnants of acidophilic material (Councilman bodies) resisting hepatic autolysis in carcasses undergoing putrefaction. This resistance of the acidophilic material to autolysis is rarely seen except in yellow fever and is quite distinctive. A control study of post-mortem autolytic changes in normal mammalian (rabbit) liver confirmed the distinctive changes in the yellow fever livers.

Although it was possible to secure satisfactory specimens in only about 10 per cent. of the investigations of the reports of dead monkeys, the investigation served as a great stimulus to the vaccination programme in rural areas by acting as a reminder of the necessity of vaccination. An analysis of the results of this study will be applied to the formulation of a project designed to attempt to check the movement of the wave in its progress towards northern Guatemala and Yucatan [see also this *Bulletin*, 1953, v. 50, 402, *bis*].

G. W. A. Dick

RABIES

REAGAN, R. L., STEWART, Mildred T. & BRUECKNER, A. L. **Study of Nine Rabies Street Virus Strains in the Syrian Hamster.** *Proc. Soc. Exper. Biol. & Med.* 1953, Aug.-Sept., v. 83, No. 4, 793-4.

Brain suspensions from animals suspected of rabies may be contaminated with bacteria, which confuse tests for rabies by intracerebral inoculation. If such contaminated suspensions of rabies virus are given to hamsters rectally, the bacterial contaminants are without effect, and the hamsters die of rabies [this *Bulletin*, 1953, v. 50, 404]. Nine strains of rabies from dog brains were tested by rectal administration to hamsters: each was given in 2 forms, one as bacteria-free glycerinated material, and the other contaminated with bacteria and not glycerinated. All hamsters receiving the glycerinated material contracted rabies, but only 65 per cent. of the non-glycerinated preparations produced the disease.

E. T. C. Spooner

REMLINGER, P., BAILLY, J. & HADJI, A. Contribution à l'étude du virus rabique, souche Flury. [Studies on the Flury Strain of Rabies Virus] *Arch. Inst. Pasteur d'Algérie.* 1953, Sept., v. 31, No. 3, 280-94.

This is a fuller account of the work described in a previous paper, abstracted in this *Bulletin*, 1953, v. 50, 1037.

BLATT, N. H. & LEPPER, M. H., with co-operation of H. N. BUNDESEN. **Reactions following Antirabies Prophylaxis. Report on Sixteen Patients.** *Amer. J. Dis. Children.* 1953, Oct., v. 86, No. 4, 395-402.

In this paper data are given on 16 patients who developed untoward reactions after prophylactic treatment with a rabies vaccine, prepared by ultraviolet irradiation of rabbit brain containing rabies virus—a vaccine which, varying in dosage according to age of patient and location of bite, is ordinarily administered over a period of 14 consecutive days.

Of the 16 cases under review one occurred in private medical practice and 15 (0.68 per cent.) among 2,193 persons vaccinated at the Chicago Health Department. In addition to the case privately vaccinated, 7 (0.32 per cent.) of the Health Department's total developed febrile reactions, with signs and symptoms of brain, spinal cord or meningeal involvement, and of this number 1 died and 3, on discharge from hospital, had residual impairment of motor or sensory function or both, while 8 (0.36 per cent.) experienced severe constitutional symptoms, without central nervous system signs.

Of the several theories which have been advanced as to the cause of such reactions, the authors consider as most probable—because of the experimental evidence in its support—the hypothesis that a constituent of the

normal nervous tissue present in the vaccine is the factor responsible for the production of the neuroparalytic accidents of antirabies treatment. The mode of action of this constituent upon the nervous system of the person receiving the vaccine is, however, as yet unknown [but the paralytic accident is commonly believed to be an expression of a sensitization reaction to the nerve substance contained in the vaccine].

In an attempt to determine whether there is a correlation between the appearance of reactions to the rabies vaccine and cutaneous sensitivity to the vaccine, the authors made use of a skin test in which 0.1 ml. of rabies vaccine diluted 1 in 10 with 0.85 per cent. saline was given intradermally. All patients among the 7 treated, who had a clinical reaction to the vaccine, proved to have a positive skin test. Of 45 persons, however, who were skin-tested on the 10th to 14th day of treatment and had no clinical reaction, 27 (60 per cent.) showed positive tests. On the other hand, 39 persons, who had never received rabies vaccine, had no reaction to the skin test. It was concluded, therefore, that skin sensitivity occurs in a large percentage of persons vaccinated and that of these only a small percentage has systemic symptomatology.

In view of its known anti-allergic action and its demonstrated anti-inflammatory activity in many conditions, including experimental encephalomyelitis, corticotrophin was administered to 3 patients, whose vaccination had been complicated by serious involvement of the nervous system, namely, to 2 with dorso-lumbar myelitis and to one with Landry's ascending paralysis. Of these the first 2 responded satisfactorily—no further extension of the lesion having followed the institution of treatment—but the third, to whom corticotrophin was given irregularly and late in the disease (9 days after onset), derived only questionable benefit, inasmuch as spastic paralysis of the legs, weakness of the back and abdominal muscles, as well as sensory changes were still present 2 months after admission to hospital. In all 3 cases corticotrophin was given intramuscularly. In the authors' view it was suggestive, but not proved, that corticotrophin may have been effective in treating these cases, but further evaluation of its usefulness is indicated.

[McFADZEAN and CHOA have recently reported favourable results following treatment with ACTH (20 mgm. being given daily, intravenously by drip, over 24 hours) in 2 cases of encephalomyelitis and in one case of ascending myelitis. The response of such reactions to ACTH and cortisone is considered by these authors to strengthen the conception that neuroparalytic accidents of this type (with perivascular myelinoclasia as their pathology) are the expression of a sensitization reaction to the nerve substance contained in the vaccine. GARRIDO-LECCA and TOLA (this *Bulletin*, 1953, v. 50, 930) also record the success of corticotrophin therapy in a case of myelitic involvement following antirabies treatment.]

Because of the fact that certain of their patients with nervous system involvement, to whom one or more doses of vaccine had been given after the development of constitutional symptoms, showed progression of their reactions, the authors are of opinion that vaccine administration should be discontinued immediately on the appearance of the following symptoms, when such cannot be ascribed to another disease: fever, headache, emesis, anorexia, radicular pain, generalized weakness and weakness of the legs. [Severe constitutional symptoms during administration of the vaccine—fever of sudden onset (often associated with shivering or rigors), headache, intense backache, nausea and vomiting, generalized aches and pains, frequently, but not invariably, herald involvement of the central nervous system.]

G. Stuart

WEINSTEIN, L. & GOLDFIELD, M. **Reactions to Rabies Vaccine: with a Report of Two Cases of Encephalomyelitis.** *Boston Med. Quarterly.* 1953, Mar., v. 4, No. 1; 7-13. [24 refs.]

Two cases of encephalomyelitis attributed to anti-rabies vaccination are described. One was fatal, the other not.

The case descriptions are preceded by a useful essay on reactions to rabies vaccine, dealing with their nature and their frequency.

The discussion starts: "There is little doubt that vaccination against rabies is not a procedure to be undertaken lightly". Sellers's advice at an American Public Health Association Conference concerning contra-indications of anti-rabies treatment are quoted. [SELLERS, T. F., *Publ. Hlth. Rep.*, Wash. 1951, v. 66, 1117—this reference is given incorrectly in the article.] Sellers's recommendations were: "(1) when there is no broken skin anywhere on the body, including face or mouth; (2) if previous wounds are known to be over 24 hours old or are covered with an unbroken scab; (3) if the tooth wounds were made through untorn clothing (such injuries are usually bruises); (4) if exposure is limited to handling only the dog or objects contaminated with its saliva or to drinking the milk of rabid cows or goats; (5) if the wounds were inflicted not less than 7 days prior to the detection of visible signs of the disease; and (6) if the animal remains normal for as long as 7 days after inflicting the wounds".

It is stated that "The most recent case of human rabies in Massachusetts occurred in 1934. In the last five years at least 2 deaths have occurred from vaccination against rabies in man".

[This article adds one more to the well-needed warnings against indiscriminate anti-rabies vaccination.] *E. T. C. Spooner*

TURNAUER, Elisabeth F. **Neurological Complications following Antirabies Vaccination.** *Arch. Pediatrics.* 1953, Feb., v. 70, No. 2, 45-60. [44 refs.]

This is an essay by a recent graduate published to encourage the writing of articles by senior students and fledgling doctors.

It is comprehensive, up to date and has an extensive bibliography.

After a brief historical review, theories regarding the aetiology, pathology, the clinical signs and symptoms of neurological complications following anti-rabic vaccination are discussed. Experimental work and measures for the prevention and treatment of neurological complications are reviewed and evaluated. A case is described in detail. *George R. McRobert*

PLAGUE

ECKE, D. H. & JOHNSON, C. W. **Plague in Colorado and Texas. Part I. Plague in Colorado.** *Pub. Health Service Publication No. 210. Pub. Health Monograph No. 6.* Wash. 1952, Nov., 1-37, 11 figs. [19 refs.]

MILES, V. I., WILCOMB, M. J., Jr. & IRONS, J. V. **Part II. Rodent Plague in the Texas South Plains 1947-49, with Ecological Considerations.** *Ibid.*, 39-53, 6 figs. [12 refs.]

This monograph consists of two descriptions of surveys of conditions associated with sylvan or wild-rodent plague, one in Colorado and the other

in Texas. The survey in Colorado, described in the first paper, was carried out from September, 1948, to November, 1949, by an entomologist and a mammalogist whose objectives were, to locate and study sylvatic-plague epizootics, to determine the possible rôle of domestic rats in plague ecology in Colorado, and to determine the possible dangers to human beings from plague. The first subject discussed is the history of plague in the U.S.A.; the authors give plausible reasons for thinking that infection may have existed among the sylvan rodents of North America for many years before it was detected; they argue that if there had been rodent infection all over the United States before the occurrence of the human epidemic of pneumonic plague in California in 1900 the field surveys, starting in the affected region and extending progressively to other areas would have created the impression that infection was spreading from the place where it was first detected, whereas it might have been recognized for the first time. They find it hard to believe that a disease like plague could have spread so rapidly over the vast region of the western United States.

Plague was first discovered in Colorado among marmots and ground squirrels in 1941, but no case of human plague has yet been demonstrated in the state. The methods and findings of the survey of the rodents and their fleas are described. A list is given of 30 places in which plague has been detected in the State, mostly in pools of fleas from prairie dogs and ground squirrels.

Predatory birds and mammals are not believed to play important parts in spreading infection except that coyotes are suspected of transporting fleas from place to place in the course of their travel, which may be as far as 15 miles in one day.

An astonishing intervention by man is described; ranchers in the western United States, in their anxiety to control the prairie-dog pest, have been known to visit distant places where prairie dogs are known to be dying of plague and to capture some of the sick animals which they release in the colonies on their own land with a view to starting an epizootic which is well known to be the most effective method of eliminating the troublesome rodent. The authors are satisfied that this practice is exceedingly common, though only 3 confirmed examples are known to them, including one case in which a journey of 250 miles was made.

The Colorado mammals are listed and described and so are their fleas. A survey of the domestic rats of Denver City and of the wild rodents found in and near the city is described; *Rattus norvegicus* is the only rat found in Denver and in one area it was found to be heavily infested with *Xenopsylla cheopis*, but the risk of an outbreak of the disease in man is considered to be small even if the domestic rats became infected from sylvan rodents.

The second part of the memoir contains a description and discussion of a survey of plague among wild rodents in a group of 9 counties of western Texas during the two years 1947 and 1948. The first record of plague in Texas was in June to November, 1920, when there were 32 human cases with 18 deaths in Galveston and Beaumont. Infection appears to have been introduced by shipping and the native wild rodents seem to have escaped infection; at any rate none was found among 77,800 wood rats and other rodents of the neighbourhood. Wild-rodent plague was strongly suspected of having occurred in one area of Texas in 1945; it was confirmed in 2 other areas in 1946 and 1947. The area covered by the survey now described is 8,620 square miles of treeless plain at an altitude of 3,000 to 4,000 feet. The population was about 165,000, of which 40 per cent. were rural. Fleas from nearly 16,000 wild rodents and rabbits and from 1,426 domestic rats were examined. *Pasteurella pestis* was recovered from 22

pools of fleas and rodent tissues. Pack rats (*Neotoma micropus*) and their fleas, chiefly *Orchopeas scordentatus* were the sources of 18 of the strains recovered. Most of the findings were made during epizootics when the rodents were found to be dying. No infection was found among the domestic rats examined; apparently these rarely become infected from wild rodents.

The authors of this part of the monograph subscribe to the usual view that plague among rodents in the U.S.A. has spread eastwards from California since 1900.

[Everyone interested in plague ought to read this monograph, which cannot adequately be reviewed. A notice on the inside of the cover states that single copies of most Public Health Monographs are available upon request to the Public Inquiries Branch, U.S. Public Health Service, Washington 25, D.C.]

John W. D. Megaw

GIRARD, G. & GALLUT, J. Au sujet de la phase de latence dans la croissance de *Pasteurella pestis* en bouillon. [**The Latent Phase in the Growth of *Pasteurella pestis* in Broth**] *Ann. Inst. Pasteur.* 1953, Sept., v. 85, No. 3, 372-6, 2 figs.

The authors have confirmed the findings of SOKHEY, who in a note on the lag phase in the growth of *Pasteurella pestis* [this *Bulletin*, 1952, v. 49, 1112] has shown that the initial slow rate of growth of the organism results from poverty of the medium in certain essential nutritive factors. The rapid acceleration of the rate of growth which follows this lag phase was regarded as resulting from the production of these factors by a process of lysis of the *P. pestis* cells contained in the inoculum and of the fresh cells originating in the culture. The lag phase was found to be considerably shorter when the culture medium consisted of a filtrate of a 6-hour broth culture of *P. pestis* instead of plain broth. The authors obtained the same results and also found that filtrates of old cultures had an equally favourable effect on the rate of growth and in stimulating the production of positive cultures when the inoculum was too small to initiate growth in ordinary broth. Filtrates of cultures up to 24 days old were tested, with equally favourable results, so that there was a complete absence of any toxic or inhibiting substance such as appears to be produced on the surface of agar media on which *P. pestis* has been grown for several days and then removed leaving the medium refractory to fresh inoculation. John W. D. Megaw

SEAL, S. C. **Studies on the Specific Soluble Proteins of *Pasteurella pestis* and *P. pseudotuberculosis*. II. Complement-Fixing and Immunogenic Properties.** *J. Immunology.* 1953, Oct., v. 71, No. 4, 169-76. [22 refs.]

The author describes further studies of the specific soluble proteins of *Pasteurella pestis* and *P. pseudotuberculosis* obtained from filtrates of broth cultures by differential precipitation [see this *Bulletin*, 1952, v. 48, 138]. Complement-fixation tests in which the antigen was the fraction precipitated by one-third saturation with sodium sulphate (the $P_{\frac{1}{3}}$ fraction) gave similar reactions with antigens made from both virulent and avirulent "protective" strains of *P. pestis*, but different reactions with antigens of avirulent non-protective strains.

The protective power of the Haffkine (Bombay) vaccine is found to lie in the protein fractions of the supernatant fluid of cultures, and specially in

the $P\frac{1}{2}$ fraction which the author thinks may possibly prove to be superior to the whole vaccine.

The work described in this paper was done in 1942-1945, and the paper was submitted for publication in May, 1951. John W. D. Megaw

OLIFF, W. D. **The Mortality, Fecundity and Intrinsic Rate of Natural Increase of the Multimammate Mouse, *Rattus (Mastomys) natalensis* (Smith) in the Laboratory.** *J. Animal Ecology*. 1953, Nov., v. 22, No. 2, 217-26, 2 figs.

The author writes from the Plague Research Laboratory, Department of Health, Johannesburg. *Rattus natalensis* is most commonly referred to as *Mastomys coucha*, and is closely associated with plague. The work is specialized and the paper should be read in full by those interested in the ecology of these animals. Charles Wilcocks

BALTAZARD, M., SEYDIAN, B., MOFIDI, C., BAHMANYAR, M. & POURNAKI, R.
 Sur la résistance à la peste de certaines espèces de rongeurs sauvages.
 I. Faits observés dans la nature. [**Resistance to Plague among Certain Wild Rodents**] *Ann. Inst. Pasteur*. 1953, Oct., v. 85, No. 4, 411-42.
 [15 refs.]

This is a lengthy description and discussion of a continuation of the study of plague among certain species of *Meriones* in Kurdistan already dealt with in a paper by the authors [see this *Bulletin*, 1952, v. 49, 1041]. A small pocket of infection has been kept under close observation from 1947 to 1952 and has shown the following features. There has been an absence of epizootic outbreaks of plague and of highly susceptible rodents. Enzoötic infection with seasonal variations persists among the *Meriones*, whose relatively high resistance enables them to maintain their numbers. This and other pockets of infection have strictly defined boundaries and tend to be permanent, but are difficult to detect. The *Meriones* show considerable variations in their individual resistance to infection and even the same one may show variations in its resistance from time to time. For this reason there are always enough of the rodents in a susceptible condition to admit of fresh infection and also enough are so resistant that they can maintain persistent infection among themselves and among their fleas which seem to play a specially important part in preserving the continuity of the chain of infection. These foci are not very dangerous to human beings, among whom there are only rare sporadic attacks of plague, apart from occasional outbreaks resulting from man-to-man transmission.

The authors believe that relatively resistant rodents may everywhere in the world be the primary reservoir from which epizootics originate among the more susceptible rodents, especially squirrels, which are therefore secondary hosts, the rat remaining the sole disseminator, the "liaison rodent number one". The hope is expressed that in view of the restricted area of each infected pocket it may be possible to eradicate the foci of infection and so to prevent secondary epizootic outbreaks among the more susceptible species of rodents.

[Everyone will agree that it is desirable to eliminate the persistent foci of infection but few will be optimistic regarding the ease of control of wild-rodent plague.] John W. D. Megaw

POLLITZER, R. **Plague Studies. 10. Control and Prevention.** *Bull. World Health Organization.* Geneva. 1953, v. 9, No. 4, 457-551. [244 refs.]

This is the tenth, and last, of the series of studies which will be published in French and English editions as a manual on plague. The only comment needed is that the same high standard of excellence has been maintained as in the previous studies. Manuals of this kind are often the work of several authors and therefore are specially liable to such drawbacks as inequality of treatment, overlapping, and contradictory views. In the present study, which deals with control and prevention of plague, special attention has been paid to the methods of control of the rodents concerned and their fleas. Details are given of the practical employment of a comprehensive range of rat poisons, including the recently introduced anticoagulants. DDT naturally occupies first place among the insecticides, the other chlorinated hydrocarbons such as dieldrin and aldrin are mentioned as being possible competitors, still under trial. There can be few questions regarding the prevention and control of plague that are not adequately answered. The author is to be congratulated on the completion of a very heavy, but fruitful, task; he and all concerned with the production of the book deserve the thanks of every student of plague.

John W. D. Megaw

RYCKMAN, R. E., AMES, C. T. & LINDT, C. C. **A Comparison of Aldrin, Dieldrin, Heptachlor and DDT for Control of Plague Vectors on the California Ground Squirrel.** *J. Econom. Entom.* 1953, Aug., v. 46, No. 4, 598-601.

The authors state that in November, 1950, Colonel Robert TRAUB recommended the adoption of trials in the field of new chlorinated hydrocarbons for the control of rodent fleas and that his unpublished data indicated the great efficacy of aldrin and dieldrin in controlling the trombiculid mite vectors of scrub typhus in Malaya. In laboratory tests of 620 insecticides C. N. SMITH (*Amer. J. Trop. Med.*, 1951, v. 31, 252) found that 29 compounds were more effective than DDT against *Ctenocephalides felis* and *Xenopsylla cheopis*; specially effective were heptachlor, dieldrin, aldrin, BHC, chlordane and parathion. The present authors in 1951 tested 8 chlorinated hydrocarbons by dusting them into squirrel burrows; they found heptachlor, aldrin and dieldrin specially suitable for further study. The flea index of the squirrels after dusting with a 5 per cent. DDT powder was 90.85; with 3 per cent. heptachlor it was 2.0; with 1.5 per cent. aldrin it was 2.22; and with dieldrin 2 per cent. it was 3.91.

The next step was to compare the effectiveness of different methods of applying dieldrin; this was found most effective when sprayed into each burrow at the rate of 0.64 gm. actual insecticide.; by this method the flea index was reduced from 38 or more to 0.48. After each burrow had been dusted with the same quantity of actual insecticide the index was reduced to 2.51. General surface spraying at the rate of 1.04 lb. per acre reduced the index to 1.15; surface dusting at almost the same rate reduced the index to 4.87.

In the main field tests 5 similar areas, each of 44,100 square feet, were enclosed by specially designed electric fences and heavily stocked with ground squirrels, at about 150 to the acre. In these conditions a heavy rate of infestation soon developed. Four of the areas were treated by dusting each burrow opening with 30 gm. of insecticide at the strengths shown in the table which gives the results of the experiments.

Insecticide	Flea Index			
	Original	3-4 days after dusting	13-17 days after dusting	35 days after dusting
Heptachlor (2.5 per cent.) ..	111.2	0.058	0.23	0.11
DDT (5 per cent.)	258.7	107.7	74.3	6.92
Dieldrin (2 per cent.) ..	318.05	0.93	2.03	0.02
Aldrin (2.5 per cent.) ..	128.05	0.13	1.83	0.07
None (control)	171.35	No test	No test	99.67

John W. D. Megaw

CHOLERA

JENSEN, K. E. **Immunologic Characterization of a Mucinolytic Enzyme of *Vibrio cholerae*.** *J. Infect. Dis.* 1953, July-Aug., v. 93, No. 1, 107-10.

Investigations were carried out on the mucinolytic enzyme of *V. cholerae* and the method by which it might be incorporated in a vaccine, in view of the possibility which had been suggested that mucinase may participate in the pathogenesis of cholera although, as the author remarks, there is no evidence as yet that such is the case. Rabbits were immunized with bacterial suspensions prepared in different ways and with mucinase-containing solutions, the agglutinin titres and antimucunase values of their sera being subsequently determined. It was found that there was no correlation between agglutinin titre and antimucunase titre, the mucolytic factors not being antigenically related to the heat-stable antigens of the vibrio. Immunization with mucinase-containing filtrate gave rise not only to high antimucunase titres but also to agglutinins, the latter being probably due to the presence of heat-stable antigen as the result of autolysis. The antigenic properties of the mucinase were not impaired by lyophilization and lyophilized material in sealed ampoules maintained its activity after heating at 100°C. for one hour, but in solution it lost its activity when heated at 56°C. for 30 minutes.

Viable suspensions of washed *V. cholerae* produced antimucunase titres at low level but suspensions treated by heat, phenol or formalin produced little or none. On the other hand when merthiolate was added at a concentration of 0.01 per cent. the loss was no greater than without preservative. On these results it was concluded that, for the preparation of a vaccine including mucinase in stable form, the suitable procedure would be to use merthiolate as a preservative and lyophilization for stabilization. A vaccine was accordingly prepared by adding to a suspension of washed *V. cholerae* containing 8×10^9 viable vibrios per ml. an equal volume of the filtrate factor, and then adding merthiolate to a concentration of 0.01 per cent. The mixture was lyophilized and the ampoules filled with nitrogen and sealed. On rehydration the vaccine was found to give good antibody production and there was no loss in mucinase activity as compared with the original filtrate. Methods for evaluation of antimucunase are presented.

J. Taylor

SARKAR, J. K. & TRIBEDI, B. P. **Antagonism between *Vibrio cholerae* and *Bacterium coli*.** *Indian J. Med. Sci.* 1953, Aug., v. 7, No. 8, 403-8, 1 graph.

Antagonism between *V. cholerae* and *Bact. coli* is suggested on the basis of certain cultural experiments. Culture in association was carried out by adding a loopful of a 24-hour broth culture of an Inaba or an Ogawa strain to 10 ml. of a 24-hour broth culture of *Bact. coli*, the mixture being subsequently plated out daily and the numbers of vibrio and *Bact. coli* colonies counted. During the first few days (3 to 14) only *Bact. coli* colonies appeared on the plates, but later (8 to 30 days) vibrio colonies appeared and increased in proportion day by day and were eventually isolated in pure culture, *Bact. coli* apparently having been eliminated. The broth culture of *Bact. coli* which had an original pH of 7.6 showed a reaction of 7.2 after 24 hours' incubation. After the addition of the *V. cholerae* inoculum a gradual change to the alkaline side occurred, vibrios appearing at pH 8.8. When the pH reached 9.2 *Bact. coli* could no longer be isolated. It was found that the proportionate numbers of *V. cholerae* and *Bact. coli* present in the original mixture had no effect on the time of disappearance of *Bact. coli*. When the surface of the medium was large, as is a Roux flask, *Bact. coli* were more rapidly eliminated than in a test tube with small surface area. Similar results were obtained with vibrios and *Bact. coli* present in the same stool, with vibrio strains of different ages, and with non-cholera vibrios.

When a fresh inoculum of *Bact. coli* was added to a tube in which only *V. cholerae* had survived it disappeared rapidly. When, however, such a tube was heated at 60°C. for one hour to kill the vibrio, *Bact. coli* was able to grow in it. This is taken to indicate the presence of a thermolabile colicidal substance. The authors do not consider that the rise in pH is the sole cause of the disappearance of *Bact. coli* as it had been observed that on prolonged incubation a broth culture of the organism rises to pH 9.0 at which it survives and also that it is viable for several days in a medium raised to pH 9.8 by the addition of alkali in which the level comes down to 9.3 after 24 hours' incubation.

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SIMITCH, T. & PETROVITCH, Z. Recherche de protozoaires intestinaux chez l'homme par culture à partir des selles fraîches. [Survey of Human Intestinal Protozoa by Culture of Fresh Stools] *Ann. Parasit. Humaine et Comparée*. 1953, v. 28, No. 3, 157-62.

The authors record the results of a survey for intestinal protozoa carried out in 4 orphanages from different parts of the province of Banat, in Yugoslavia. The total number of children, whose ages ranged from 3 to 16 years, was 232. Their stools were examined directly in faecal smears (for cysts), and by culture in a medium consisting of Loeffler's serum slope covered with saline. The results were as follows per cent. (the figures in brackets refer to cysts, those outside to trophozoites): *Entamoeba coli* (30-89); "*E. dispar*" (10-44) 14-54; *Endolimax* (8-42) 10.4-60; *Iodamoeba* (2-32) 26.6; *Giardia* (4-35); *Trichomonas hominis* 4.5-32; *Tricercomonas*

[= *Enteromonas*] 9-33; *Chilomastix* 1.5-27.5. [The name *E. dispar* refers to *E. histolytica* in its commensal phase, as found in symptomless carriers.]

C. A. Hoare

KRAUS, H. **Chronic Diarrhea. A Clinical and Laboratory Study of 39 Cases.** *U.S. Armed Forces Med. J.* 1953, Nov., v. 4, No. 11, 1584-6.

The author states that 10 per cent. of 3,100 admissions to the medical wards of an Army hospital in Tokyo were for diarrhoea and dysenteric diseases, many of them chronic.

To determine the common causes of this chronic diarrhoea in troops in Japan and Korea, stools were examined of 39 United Nations soldiers admitted consecutively from September, 1952, to March, 1953, with a history of 4 or more loose stools daily for at least a month. Twenty-six patients were from the United States and the remainder from Europe, South America, the West Indies or Ethiopia. Conventional methods of examination for parasites, ova and bacteria were made, by concentration and cultural techniques. Rectal and sigmoidoscopic specimens were examined in each case.

A table shows that 27 patients had *E. histolytica* trophozoites, cysts or both. Amoebiasis could have been diagnosed in an ordinary stool in 16 patients and in a purged stool in 9. Seven patients had protozoa other than *E. histolytica* or metazoan parasites.

Mucosal abnormalities suggesting amoebiasis were seen in 23 of the 27 patients with amoebae and in 4 of the 12 without them. One patient, who had severe diarrhoea, showed sigmoidoscopic and X-ray evidence of chronic thrombotic ulcerative colitis, without any pathogenic organism. No pathogenic enteric bacteria were isolated in any case.

In discussion the author points out that there is an impression that chronic ulcerative colitis is rare in the Army. Bacillary dysentery is probably not uncommon, but is often treated with antibiotics without admission to hospital. Indiscriminate use of antibiotics in the treatment of diarrhoea will make the diagnosis of amoebic dysentery more difficult and will not produce a satisfactory cure of it.

It is pointed out that the high incidence of *E. histolytica* is not unexpected, in the light of the environmental background and the fact that many had acquired their infections elsewhere. H. J. O'D. Burke-Gaffney

SAWADA, T., SUZUKI, I. & OKA, T. **Bacterial Cell Components as a Substitute for Serum in the Culture Medium for *Entamoeba histolytica*.** *Gunma J. Med. Sci.* Maebashi. 1953, Apr., v. 2, No. 2, 137-43. [17 refs.]

As a step in development of bacteria-free cultures of *Entamoeba histolytica*, the authors have studied the effect upon the growth of this amoeba of the cell components of various bacteria. For this purpose, bacteria from 24-hours' cultures were diluted with the fluid part of the amoebic medium, then they were frozen and thawed, and finally filtered to eliminate any viable organisms left. The bacteria used were 2 strains each of *Staphylococcus aureus*, *Bacillus mycoides* and *Bacillus coli communis*. The diphasic medium consisted of a slant containing 1 gm. asparagin, 10 gm. agar, 1 litre Ringer's solution, while the overlay was made with 1 gm. sodium citrate, 100 ml. Ringer's solution and from 0.5 to 12 mgm. of bacterial cell components. After addition of 2 loopfuls of starch, the amoebae with the

concomitant flora were inoculated into this medium and the results were assessed by counting the number of trophozoites seen under low power of the microscope in the original cultures and in subcultures. Rich cultures were obtained in the media containing the components of all the bacteria except *B. coli*, which was less favourable for the growth of *E. histolytica*. Equally good results were obtained in cultures containing—in addition to the bacterial components—cholesterol (0.6 mgm.).

C. A. Hoare

SAWADA, T., OSHIMA, T. & SUZUKI, I. **Oxidation-Reduction Potentials in relation to the Cultivation of *Entamoeba histolytica* and to the Establishment of Amoebic Infection.** *Gunma J. Med. Sci.* Maebashi. 1953, Apr., v. 2, No. 2, 127–35, 5 figs. [10 refs.]

The data on oxidation-reduction potentials and their significance in cultures of *E. histolytica* are somewhat confusing. JACOBS [this *Bulletin*, 1951, v. 48, 632] has given a good summary of the position. He notes that production of suitable potentials by bacteria has been put forward in explanation of their function in aiding growth. He found wide variations in Eh values over a period of days and it is still not clear whether the Eh value is of importance *per se* in view of the number of factors which influence it. He concluded that *E. histolytica* can multiply under less exacting conditions of anaerobiosis than have previously been thought necessary for growth. BRADIN and HANSEN (*J. Parasitology*, 1948, v. 34 (Suppl.), 11) pointed out that negative oxidation-reduction potentials are associated with growth, encystation and excystation of this parasite.

In the present investigation *E. histolytica* has been grown in culture with *B. subtilis* and during a period of 10 hours the Eh values were recorded at short intervals. The values obtained ranged from 0 to –150 mV. Similar measurements were made on the intestinal contents of a number of animal hosts. The lowest potential values were found in the caeca and ranged from –150 to –450 mV.

J. D. Fulton

FRYE, W. W., BROOKE, M. M. & WEINSTEIN, P. **Antibiotics in the Treatment of Acute Amoebic Dysentery.** Reprinted from *Ann. New York Acad. Sci.* 1952, Dec., v. 55, Art. 6, 1104–13. [29 refs.]

After a review of some of the literature [mostly American] on the effect of treatment with antibiotics of human and of animal infections with *Entamoeba histolytica* the authors state that a favourable opportunity for re-examining their value in cases of acute amoebic dysentery presented itself in Korea in 1951. An outbreak occurred among prisoners-of-war held in South Korea; those patients passing stools containing blood, those with marked diarrhoea, and those with "fever, or obvious general manifestations" were put in hospital; unless so acutely ill as to demand prompt treatment, treatment was held until specimens of stool had been examined microscopically and bacteriologically. In the later stages of the study every patient was sigmoidoscoped and material was aspirated for microscopical and cultural study [? culture for amoebae]. At first all patients from whom trophozoites of *E. histolytica* were recovered in the stools, but later only those with sigmoidoscopic evidence of ulceration from which vegetative *E. histolytica* were recovered, were put on anti-amoebic treatment.

During the first week of treatment stools were examined daily; a sigmoidoscopy was then done, with microscopical and bacteriological examinations; subsequently a stool examination and sigmoidoscopy with

examination of an aspirate were done weekly for 5 weeks. If no parasites had been found at the end of the sixth week the patient was purged and 3 of the resultant stools were examined, the first of them by a formalin-ether sedimentation technique. Blood was taken for complement-fixation tests at the beginning of treatment, 3 weeks later, and at the end of the sixth week.

By these means a diagnosis of acute amoebic dysentery was established in 10 per cent. of the patients sent to hospital in May, June and July, 1951; there was a rather higher percentage of cases thereafter. The patients with proved acute amoebic dysentery were divided into 4 groups. One group was treated with terramycin [oxytetracycline], a second with aureomycin, a third with chloramphenicol and the fourth was given a placebo. The treatment given each of the first 3 groups was the oral administration of 0.5 gm. of an antibiotic drug every 6 hours for 10 days. No toxic side-effects or reactions followed the use of any of these drugs. The results are set out in the following table:—

		Number Treated	Successes		Failures	
			No.	%	No.	%
Terramycin ...	...	40	39	97.5	1	2.5
Aureomycin ...	...	41	29	70.7	12	29.3
Chloramphenicol ...	...	39	21	53.8	18	46.2

The authors conclude that of the 3 antibiotics tested on cases of acute amoebic dysentery, terramycin was the most effective, aureomycin was less so, and chloramphenicol was much less effective than either of these.

A. R. D. Adams

MOHR, W. & SCHWARTING, G. Die Therapie der Amöben-Hepatitis und des Amöben-Abszesses mit Resochin. [**Treatment of Amoebic Hepatitis and Amoebic Abscess with Resochin (Chloroquine)**] *Ztschr. f. Tropen-med. u. Parasit.* Stuttgart. 1953, Oct., v. 4, No. 4, 555-9. [17 refs.]

The English summary appended to the paper is as follows:—

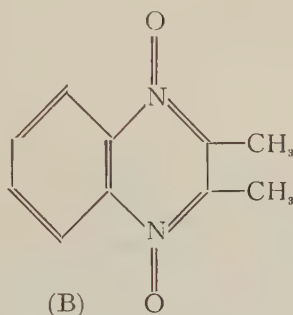
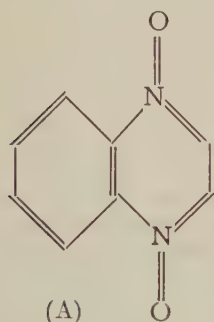
“A case of amebic hepatitis complicated by abscess formation and contiguous pleurisy was treated with Resochin. Results were favorable. A small amount of emetine given simultaneously cannot be held responsible for the cure. The original amebic dysentery was most satisfactorily influenced by yatren treatment.

“In agreement with other authors, a total dosage of 16.75 grams Resochin (5 single tablets daily for three days, 4 tablets for eight days, 2 tablets for ten further days) is proposed in cases of amebic hepatitis or liver abscess. [One tablet contains 0.25 gm.] Resochin dosage is to be varied according to the gravity of cases or combined with emetine intravenously. In order to cure the concomitant intestinal amebiasis, yatren, enterovioform or viasept are recommended in dosages of 22 to 25 grams spread over ten days and given orally or by retention enema.”

JONES, W. R., LANDQUIST, J. K. & STEWART, G. T. **Synthetic Amoebicides: Part II. The Anti-Amoebic Action of Quinoxaline-1:4-Dioxide and some Derivatives.** *Brit. J. Pharmacol. & Chemotherapy.* 1953, Sept., v. 8, No. 3, 286-9.

In a programme for screening potential amoebicides compounds were selected which (1) might serve as antagonists of vitamins, and (2) which

would bring about alteration in oxidation-reduction potentials in the amoebic environment and thus render conditions unfavourable for the parasites. Quinoxaline 1:4-dioxide had previously been used as an antagonist of vitamin K and although the authors state there was no valid reason for supposing that it would be active against *E. histolytica*, the parent substance and derivatives were tested against experimental infections with this parasite and in human infections. Quinoxaline 1:4 dioxide (A) and its 2:3-dimethyl derivative (B) have the following constitutional formulae.



Rats of 20 to 35 gm. weight were inoculated intracaecally with amoebae from cultures as previously described by JONES [this *Bulletin*, 1947, v. 44, 313]. Drug was given orally twice daily in solution or suspension to the infected rats on the first and second days after inoculation. On the fifth day the rats were killed and the degree of infection was assessed. As a result of these experiments in rats, and toxicity, absorption and excretion tests in animals, as well as *in vitro* studies, the above 2 substances and the 6-chloro-2:3-dimethyl derivative were selected for further study. They were found to have a therapeutic effect in one or more infections with *E. histolytica* in rats, cats, dogs, and monkeys. The parent compound was tested in 14 human patients, with acute or chronic amoebic infections. The drug, like the others of this class, was unstable in solution, and although well tolerated in 9 of the 14 subjects, gave rise to toxic effects including nausea, vomiting, and cramp in the legs in the remaining 5 and in one case administration had to be discontinued. It showed little therapeutic activity. The 2:3-dimethyl derivative proved too toxic for use in man. The third compound was also inactive in human infections and likewise proved toxic.

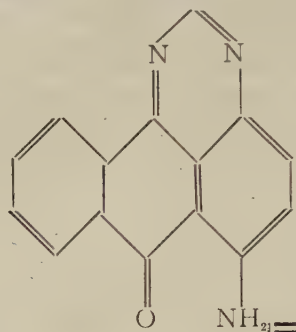
[The favourable results obtained in amoebic infections in rats with these compounds and the poor results obtained in human infections, accompanied by unforeseen toxic symptoms, throw some doubt on the value of the use of the rat in screening tests.]

J. D. Fulton

SENIOR, N. **Synthetic Amoebicides: Part III. Estimation of 6-Amino-anthracyrimidine in Tissues: Metabolism and Excretion.** *Brit. J. Pharmacol. & Chemotherapy*. 1953, Sept., v. 8, No. 3, 290-96, 3 figs. [11 refs.]

It was previously shown by JONES *et al.* [this *Bulletin*, 1952, v. 49, 1119] that 6-aminoanthracyrimidine of the following constitutional formula and some of its derivatives were effective in treatment of young rats experimentally infected with *E. histolytica* and also against the parasite *in vitro*. It was also found that in rats and mice a serious photodynamic effect occurred.

In order to investigate this phenomenon a fluorimetric method of estimating the parent compound in tissues has been developed, thus allowing



its distribution, metabolism and excretion to be studied in rabbits and rats. The method depended on the fact that the drug in benzene gave rise to a green fluorescence. Solutions of the substance were made up to contain 1 μ gm. per ml. for use in making a standard curve. Benzene used for extraction was purified by distillation. A Spekker photoelectric absorptiometer was adapted as fluorimeter for use with a filter Green W7. For preparation of a standard curve, extractions of the drug in amounts ranging from 5 μ gm. downwards were made from aqueous solution in presence of disodium hydrogen phosphate and excess sodium chloride with 20 ml. quantities of benzene. A similar procedure was used to extract the drug from 5 ml. of blood or plasma or 0.5 gm. of homogenized tissue in the same volume. The estimation of unchanged drug in urine and faeces was carried out in the same way. During these experiments the animals used were shielded from light to prevent sensitization of skin.

A water-soluble metabolite recognized as the dihydro- or leuco-form was present with unchanged drug in the urine and could be reconverted to the original on treatment with acid. About 8 per cent. of the drug appeared in the urine as glucuronide but the amount of ethereal sulphate was not raised. In the blood a high concentration was rapidly attained and persisted for 24 to 48 hours in different animals. Although the drug was readily absorbed and metabolized when given orally the final fate of only a small percentage could be accounted for. It has been shown that amoebicidal activity was not concerned with photochemical decomposition which takes place most readily under alkaline conditions, but was due to the parent substance.

J. D. Fulton

HASKINS, W. T. & LUTTERMOSER, G. W. **Urinary Excretion of Vioform and Diodoquin in Rabbits.** *J. Pharmacol. & Exper. Therap.* 1953, Oct., v. 109, No. 2, 201-5.

"Rabbits were given Vioform or Diodoquin orally once daily for 5 days and the urine collected for 7 days. The daily dosage for Vioform was 20 and 200 to 268 mgm./kgm. and for Diodoquin 20 and 100 to 139 mgm./kgm. The urine samples were analysed for the free and conjugated drugs and for the free and conjugated metabolic products in which the 8-quinolinol nucleus was intact. The results showed that only the conjugated, unmodified drugs were present in the urine. In the case of Vioform 12 to 15 per cent of the drug was recovered from the urine at the 200 mgm./kgm. dose and 38 to 50 per cent at the 20 mgm./kgm. dose. For Diodoquin, 11 to 16

per cent of the drug was recovered in both the 20 and 100 to 139 mgm./kgm. dosages. The conjugates were shown to be mixtures of the sulfuric and glucuronic acid esters of the respective drugs."

ELSDON-DEW, R. *Isospora natalensis* (Sp. Nov.) in Man. *J. Trop. Med. & Hyg.* 1953, July, v. 56, No. 7, 149-50, 3 figs.

The author has previously detected in the stools of an African in Durban a peculiar form of *Isospora* resembling *I. rivolta* [this *Bulletin*, 1954, v. 51, 63]. Having again found the same coccidium under circumstances which precluded both "gut-passage" and chance contamination, the author concluded that he was dealing with a true human parasite, which has not hitherto been reported.

The oöcysts were passed 4 days in succession in the stools of an African, and were revealed by the zinc sulphate flotation method. They were usually immature, but underwent sporogony *in vitro* in 24 hours. The characters of this coccidium differ from those of *I. belli* and *I. hominis*, which are both accepted by the author as independent species. In the new parasite the oöcysts measure $30 \times 24-25 \times 21 \mu$; the sporocysts, which occupy an equatorial position, measure $17 \times 12 \mu$, and contain an irregular residue of loose coarse granules. Illustrations are given of the immature and mature oöcysts, and a table sets out the differential characters of the other 2 species of human *Isospora*. For the new one the name *I. natalensis* sp.n. is proposed.

C. A. Hoare

BRICEÑO IRAGORRY, L. Nota sobre coccidiosis humana. [**Human Coccidiosis**] *Gac. Med. de Caracas.* 1952, Feb.-May, v. 60, Nos. 2, 3, 4 & 5, 43-6, 3 figs.

The author records the finding of 3 cases of *Isospora belli* infection among 46,404 stool examinations carried out in Caracas. Only 2 other cases of human coccidiosis have previously been reported from Venezuela.

C. A. Hoare

AGOSIN, M. & VON BRAND, T. **Studies on the Respiratory Metabolism of *Balantidium coli*.** *J. Infect. Dis.* 1953, July-Aug., v. 93, No. 1, 101-6, 1 fig. [23 refs.]

The experiments described here were carried out with cultures of *Balantidium coli* grown in presence of a mixed bacterial flora including *Bact. coli* and *Proteus vulgaris*. In preparing *Bal. coli* for respiration studies centrifugation of culture tubes was carried out a number of times, the organisms being suspended in sterile Ringer solution at each operation. Centrifugation of bacterial cultures free from *Bal. coli* was carried out at the same time and the material obtained served as control for bacterial respiration. The number of *Bal. coli* organisms present in each Warburg flask in which the respiration experiment was made at 28°C. or 37°C. was 7,000 to 15,000. During the actual measurement of respiration bacterial activity was held in check in experimental and control flasks by streptomycin. The experimental period was 60 to 90 minutes and readings were taken at intervals of 10-15 minutes.

The ciliates were found to consume considerable quantities of oxygen in spite of the fact that their environment is normally oxygen-free. Their

motility at the end of experiment was unimpaired and respiration was accelerated with increased temperature over the range studied. The respiratory quotient was approximately 1.0. Relatively large amounts of respiratory CO₂ were produced anaerobically, indicating that more than conversion of carbohydrate to lactic acid is involved. Some undetermined acids were produced. Inhibition was studied under aerobic and anaerobic conditions, the reagents being generally more effective under the latter conditions. There was in general a close correlation between respiratory inhibition and reduction of motility. Malonate and fluoroacetate which inhibit the Krebs tricarboxylic acid cycle markedly reduced the uptake of oxygen, as did cyanide, an inhibitor of heavy metal catalysts. DL-glyceraldehyde, which prevents the conversion of glucose to glucose-6-phosphate by hexokinase, had little influence on respiration, but this fact is not accepted as proof that carbohydrate was not used by the organism.

J. D. Fulton

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

BLANC, G., BRUNEAU, J. & CHABAUD, A. Comportement de quelques spirochètes chez la punaise *Cimex lectularius*. [The Behaviour of Certain Spirochaetes in *Cimex lectularius*] Arch. Inst. Pasteur du Maroc. 1953, v. 4, No. 6, 411-28. [Refs. in footnotes.]

The authors fed bed-bugs on man and experimental animals infected with one of the following strains of spirochaetes:—*S. duttoni*, *S. merionesi*, *S. hispanica* and *S. persica*. After varying intervals the contents of the bed-bugs were inoculated into susceptible animals in order to determine whether the spirochaetes had survived. The results indicate that *S. duttoni* was able to survive at least 150 days and *S. merionesi* 200 days in bed-bugs, while in the other 2 strains examined the spirochaetes soon disappeared. In no case was the infection transmitted by the bites of bed-bugs containing spirochaetes, nor were the offspring infected.

The authors consider that relapsing fever spirochaetes tend to fall into 2 groups, one derived from rodents and able to survive in the bed-bug and also in lice, and a second group without this capacity. There are also other biological differences between the 2 groups such as the type of infection produced in the anterior chamber of the eye of the rabbit, the *duttoni* group provoking an intense iridocyclitis and keratitis which is not histologically of the interstitial type with spirochaetes in the corneal tissue, while in the *hispanica-persica* group there is a typical interstitial keratitis with very numerous spirochaetes in the layers of the cornea.

In the case of *S. recurrentis* the present information is inconclusive, but the fact that it seems to acquire some of the characters of *S. duttoni* on passage in rodents, and that it will survive in the bed-bug, suggest that it is related to the *duttoni* group of spirochaetes.

E. Hindle

GRIFFITH, R. L. & McNAUGHTON, D. W. Report of a Case of Rat-Bite Fever due to *S. moniliformis*. Pub. Health Rep. Wash. 1953, Oct., v. 68, No. 10, 947-8.

A case in Seattle.

YAWS AND OTHER TREPONEMATOSES

POLLOCK, J. S. McK. **Sibbens or Sivvens—the Scottish Yaws.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Sept., v. 47, No. 5, 431-6. [12 refs.]

MACARTHUR, W. P. **"The Sibbens," or, "The Sivvens"?** [Correspondence.] *Ibid.*, 437-8.

(i) The author contends that the "sivvens" of Scotland, to which he traces an Edinburgh reference in 1497 as a disease named "gandgor", was yaws and not syphilis, and was probably brought to Europe with slaves from West Africa before Columbus sailed westwards from Europe. "The disease built up to epidemic proportions over nearly half a century, and reached such a level as to become a strategic factor at the so-called Siege of Naples in 1495." He wonders if Columbus introduced yaws into the West Indies.

The author next compares the clinical descriptions of sivvens and the environment of 17th century Scotland with the clinical picture and environment of yaws today. He concludes: "That sibbens was a local form of Morbus Gallicus modified by environment must remain a matter for interesting speculation. It would appear that it was a disease low down our biological gradient of treponematoses, approximating closely to yaws."

[The reviewer would suggest that the subject is one for historical research and not speculation. There are at least 8 authorities quoted to whom no reference is to be found in the "bibliography". Many references to the venereal origin of Morbus Gallicus are neglected as the author rather specially pleads his case which he has failed to make except for those who want to believe.]

(ii) MacArthur, in a scholarly letter, traces the origin of the word "sivvens" from the Gaelic *suibhean* for raspberry and can find no derivation for the form "sibbens". He suggests that only "sivvens" should be used to refer to this extinct disease.

C. J. Hackett

ESPINOSA, A. & AMADOR GUEVARA, J. El control del pian en la República de Panamá. [**Control of Yaws in the Republic of Panama**] *Archivos Med. Panameños.* 1952, Jan., v. 1, No. 1, 8-27, 3 maps, 2 charts, 2 diagrams & 2 figs. [15 refs.]

By reason of its endemicity, its chronicity and its liability to cause destructive lesions, deformities and invalidism, yaws is a problem of importance in the Republic of Panama. Family contact accounts for more than half the cases. The authors start with references to previous records from El Salvador, Guatemala, Nicaragua and Costa Rica. They state that the first case recorded in Panama was in a 23-year-old negro in 1914, but the disease is now prevalent in the provinces of Darien, Veraguas, Chiriqui, Bocas del Toro, Colón and Panama. In Panama the main general contributing factors are the damp climate, frequent rains, proximity of rivers, ravines and marshes, liability to floods and the primitiveness of the dwellings. Personal factors include malnutrition, local trauma (the primary lesion is nearly always on some exposed part, and especially the lower limbs, and the people go barefoot), personal hygiene is bad, there is much overcrowding and the people and their animals live much in contact.

In Darien 16 localities were studied in 1949; among a population of 7,647, 4,075 were examined and 355 cases were seen (8.71 per cent.), but in the

different districts the incidence varied greatly; thus, in Sambú 606 were examined among a population of 1,034 and 104 cases were found (17.1 per cent.), but in Pinogana, where 298 of a total population of 390 were examined, there were only 3 cases (1.0).

A table is given showing the sites of the primary lesions. A considerable proportion of the article is taken up by comparing syphilis and yaws and their lesions in the different stages.

Drugs used in treatment were: *neoursphenamine*, the average dose for an adult being 0.45–0.75 gm. to a total of 2.6 gm.; *Stabisol* (a subsalicylate of bismuth) in an average dose of 1.0 cc. and a total of 4.6 cc.; *penicillin G* with procaine and 2 per cent. aluminium monostearate, in doses of 100,000 to 300,000 units and a total of 600,000–1,200,000 units; lastly, STB, a trivalent derivative of acetarsone, given orally in doses of 0.01–0.02 gm. per kgm. body weight to a total of 0.15–0.60 gm. per kgm.

Suggestions put forward for organizing control measures include: census of the population; examination of as many of them as possible; the establishing of centres for diagnosis and treatment, and of an epidemiological service for bringing patients together and keeping them under observation; visiting teams; training of sanitation staff; gaining cooperation of the authorities and of doctors, teachers, etc. and a study of possible vectors such as *Hippelates*, *Culicoides*, *Simulium* and the Psychodidae [none of which has ever been proved to transmit the disease]. H. Harold Scott

EDMUNDSON, W. F., LÓPEZ RICO, A. & OLANSKY, S. Estudio clínicoserológico del mal de pinto. [**A Clinical and Serological Study of Cases of Pinta**] *Bol. Oficina Sanitaria Panamericana*. 1953, Aug., v. 35, No. 2, 163–77, 1 map.

The authors have investigated the existence and prevalence of pinta in 4 districts of the Valley of Tepalcatepec, Michoacán, Mexico. The valley covers an area of 19,754 sq. km. at an altitude ranging between 298 and 2,991 metres above sea level. The rainy season is from June to September during which the monthly rainfall is on an average 200 mm. The chief occupations of the inhabitants are stock-raising and the cultivation of citrus fruits; the common diseases are malaria, pinta, intestinal parasitism, goitre, tuberculosis and malnutrition. The people are mostly half-castes from miscegenation of indigenous people and Europeans. The 4 districts selected were Capirio, El Huaco, Casilda and El Ceñidor.

In Capirio 121 persons were examined; 83 were diagnosed as suffering from pinta (3 of these were doubtful), 75 were subjected to serum tests, as for syphilis, and 70 proved positive and 4 doubtful. The results are shown in a table which gives also the ages of the patients. In El Huaco and Casilda 238 were examined and 52 were suffering from pinta: 37 gave positive tests, and 6 doubtful. In El Ceñidor of 47 clinically diagnosed as suffering from pinta, 36 gave a positive serum reaction, 3 doubtful, and 8 were negative. Among 11, 185 and 151 respectively without pinta in the 3 groups of localities, 1, 6 and 21 gave positive serological tests. It was noticed that there were more family cases in Capirio than in El Ceñidor. As a matter of practical experience, the authors state, there is no real need to carry out serological test for pinta, the clinical indications (on head and neck, arms, chest and legs) are quite sufficient. H. Harold Scott

LEPROSY

LIPPI, M. & TUCCI, A. Terapia della lepra con idrazide dell'acido isonicotinico. (Nota preventiva.) [**Treatment of Leprosy with Isoniazid**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1953, Sept., v. 34, No. 9, 459-72. English summary.

Nineteen leprosy patients, 15 of the nervous form and 4 of the mixed, their ages ranging between 16 and 60 years, were given 6 tablets, each of 50 mgm. of isoniazid daily for 40 days. Any who showed ulcers also received local applications of an ointment containing 1 per cent. of the drug. The plan is to wait for about a month after this course and then repeat it for a longer period. Bacteriological examinations were carried out before, during and after the course of treatment. Brief notes are given of each of the 19 patients, stating the conditions and main symptoms present before treatment was begun, the changes "after some days" [how many is nowhere stated], after 20 days and after the 40-day course. The treatment was well tolerated by all and the fact that the patients themselves felt the improvement was evidenced by their returning on their own initiative asking for the cure to be completed and bringing others with them for the treatment. Appetite improved, they slept well, nodules became smaller and anaesthetic patches reduced. Bacterial examination of the nasal mucus and of the lymphatic glands became negative in 16 of the 19. The authors state that they intend to continue the treatment with a calcium methane-sulphonate of the drug as it is better tolerated. [This, however, is not referred to in the text.] In the early days of treatment there might be mild disturbances such as insomnia, pruritus, joint pains, diarrhoea, but these were not severe enough to interrupt the treatment and passed off in a few days.

H. Harold Scott

ROSENFELD, G., RZEPPA, H., NAHAS, L. & SCHENBERG, S. **Hemolysis and Blood Concentration of Sulfones "in Vivo"**. *Mem. Inst. Butantan.* 1952, v. 24, No. 2, 69-76, 1 graph & 1 fig. [12 refs.]

A number of authors have shown that diaminodiphenyl sulphones, which have been used chiefly in the treatment of leprosy, cause anaemia. The exact manner in which anaemia arises has not been definitely proved but may be due to haemolysis. The purpose of this investigation was to find whether certain diaminodiphenyl sulphones are haemolytic *in vivo* by administering large doses intraperitoneally to dogs and determining the amount of haemoglobin in the plasma at intervals of 30 to 300 minutes, by means of the spectrophotometer. The percentage haemolysis was calculated with reference to the total haemoglobin in the blood.

The substances used were Diasone in which the nitrogen atoms of the sulphone are combined with sodium formaldehyde sulphonylate, Promin, diaminodiphenyl sulphone combined with glucose or glycose sulphonate, and a related substance named "AMGL". It was found that haemolysis occurred in all animals and its degree depended on the concentrations of drug in the blood. The time of its appearance was influenced by the nature of the salts employed because of their hydrolysis to the parent substance at different rates. It is suggested that the degree of haemolysis is a good indication of the concentration of drug present in the blood, for which good methods of estimation are not at present available.

J. D. Fulton

HELMINTHIASIS

BERBERIAN, D. A., PAQUIN, H. O., Jr. & FANTAUZZI, A. **Longevity of *Schistosoma haematobium* and *Schistosoma mansoni*: Observations based on a Case.** *J. Parasitology.* 1953, Oct., v. 39, No. 5, 517-19, 1 fig.

Relatively little is known about the longevity of schistosomes in man, because most human infections occur in endemic areas in which the possibility of re-infection cannot be eliminated. The author gives, however, the history of a native of Yemen, Arabia, who emigrated to the United States 27 years ago, when he was 23 years old. He then settled in New York State and has not travelled beyond it since then. In February, 1951, he was treated for a "virus pneumonia" and in May, 1951, chronic duodenal ulcer, enteritis, colitis and probable chronic appendicitis were diagnosed and in June of that year his appendix was removed. Large numbers of schistosome eggs, mostly those of *Schistosoma mansoni*, with occasional eggs of *S. haematobium*, were found in granulomatous tissue in the wall of the appendix. Examination then revealed eggs of *S. haematobium* in the patient's urine and those of *S. mansoni* in the stools. The eggs were not numerous and repeated attempts to induce hatching of them failed. Many calcified eggs of *S. mansoni* were found in the patient's haemorrhoids, but cystoscopy failed to show gross macroscopic changes in the bladder. Pus appeared intermittently in the urine; when pus cells were very few, schistosome eggs were not found; when pus cells were numerous and squamous epithelial cells were also present, schistosome eggs, some of which were deformed, were occasionally found. In January, 1952, degenerated eggs of *S. mansoni* and *S. haematobium* were found in the urine and *S. mansoni* in the stools. As a child the patient had often waded in cisterns of rain water collected for irrigation and domestic use, but he had not swum in these after the age of 8 years.

The authors conclude that this patient has adult *S. mansoni* and *S. haematobium* alive and ovulating in his body 26 years after leaving the focus of his infection and that possibly his infection has lasted 40 years. They note the absence of signs and symptoms of the infection and summarize the literature on the longevity of schistosomes and that on the relatively rare incidence of *S. mansoni* in Asia.

G. Lapage

CAMAIN, R. Sur quelques tumeurs bilharziennes de l'appareil génital masculin observées en A.O.F. [**Schistosomal Tumours in the Male Genital Tract in French West Africa**] *Bull. Méd. de l'Afrique-Occidentale Française.* 1952, v. 9, No. 2, 265-9.

Fibrous tumour formation in the male genital tract as a result of *Schistosoma haematobium* infection is by no means uncommon at Dakar. Material of this sort from 5 patients has been examined at the local Pasteur Institute during the last two years. Details of each of the cases, and of the histopathology of the tumours excised from them, are given. The organs involved were the testis and epididymis, and the cord; the diagnosis in each case was made only after histological examination of the specimens. The value of cystoscopy in differentiating urinary schistosomiasis from a bacillary infection of the male genital tract is stressed.

A. R. D. Adams

TALAAT, S. M. **The Intensive Treatment of Schistosomiasis with Sodium Antimony Tartrate. A Report on 200 Cases.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Sept., v. 47, No. 5, 425-7.

The authors have already recorded the employment of an intensive antimony treatment for schistosomiasis, which is less likely than that first advocated to cause circulatory collapse in Egyptian patients [this *Bulletin*, 1948, v. 45, 719]. To obtain a higher percentage of cures they have lengthened the treatment from 4 to 5 injections, an increase from 8 grains to 10 grains of the antimony salt given to each patient. Two hundred Egyptian patients suffering from urinary schistosomiasis were given 2 grains of sodium antimony tartrate dissolved in 20 cc. of 5 per cent. glucose solution intravenously on two occasions daily, with a 6-hour interval, in the case of adults; children were similarly treated with a dose proportionate to their ages. The usual minor symptoms attended each injection, but there was no more than a slight temporary fall in systolic pressures. After 3 months, in 94 per cent. of the urines of the treated patients no ova were present, and in 5 per cent. only dead ova; from only 0.5 per cent. were living ova recovered from the urine.

A. R. D. Adams

SCHWETZ, J. Sur la bilharziose de l'agglomération de Lubudi, province du Katanga. [**Schistosomiasis in Lubudi, Katanga Province, Belgian Congo**] *Inst. Roy. Colonial Belge Bull. des Séances.* 1952, v. 23, No. 4, 1125-36, 1 folding map.

The author reports on an investigation into schistosomiasis in Lubudi, Katanga province, which has a population of 230 Europeans and 7,118 Africans. Snail surveys of 21 tributaries of the principal river, the Lubudi, revealed only Limnaeidae and Planorbidae. Details are given of the numbers collected in each stream and the percentage of planorbids found infected with schistosomes, which varied from nil to 12.3 per cent. Examination of the population for schistosome infections [presumably *S. mansoni*] was carried out with unconcentrated specimens; when the first specimen was negative a second was examined. Of 1,520 examined thus, 50.3 per cent. were found to be positive, women and children having a higher infection rate than men: 95 per cent. of those positive were lightly infected and only a few, especially the women, complained of abdominal 'trouble. Ankylostomiasis and "l'anguillulose" were found even more frequently than schistosomiasis.

J. J. C. Buckley

HELMY, M. **The Effect of Environmental Factors on the Distribution and Control of *Planorbis boissyi*, the Intermediate Host of *Schistosoma mansoni* in the Valley of the Nile.** *J. Trop. Med. & Hyg.* 1953, Feb., v. 56, No. 2, 25-32, 1 map. [13 refs.]

Having indicated the distribution of *P. boissyi* in the Nile Delta (illustrated by a map) the author discusses various theories which have been put forward to explain the irregular distribution of this species along the Nile Valley. The water salinity hypothesis is dismissed as untenable and 3 other factors are suggested, namely, the particular sensitivity of the snail to water movements, the occasional introduction of fresh specimens from the Sudan and the sensitivity of the snail to desiccation. These are discussed in relation to various ecological factors such as the slope of the

Nile in different regions, the level of subsoil water and the occurrence of water weeds, and it is concluded that the essential characters of a *P. boissyi* focus in Egypt are that the water should be (a) sufficiently stagnant and (b) sufficiently permanent. The logical weapons of control are therefore current and dryness, and their application depends upon "correct canal planning and irrigation control, whereby adequate drainage and clean (weed-free) channels with a steady flow of water are maintained, dead ends are suppressed and thorough drying-out takes place periodically".

J. J. C. Buckley

SCHWETZ, J. Recherches Malaco-Schistosomiques dans l'Agglomération de Jadotville et ses environs immédiats. [Studies of Schistosomiasis and its Snail Vectors in Jadotville and its Environs] *Ann. Soc. Belge de Méd. Trop.* 1953, Feb. 28, v. 33, No. 1, 67-85, 1 map.

The author's summary in French is freely translated as follows:

The rivers in the immediate neighbourhood of Jadotville are heavily populated with *Planorbis pfeifferi* and *Physopsis africana* and the infection rates in these snails with schistosome cercariae are respectively 6 to 7 per cent. and 0.2 per cent. Infected *Planorbis* usually discharge very large numbers of cercariae, unlike *Physopsis*. The cercariae from *Planorbis* seem to be very virulent, for although all the mice exposed to them became infected, they all died before the infection reached maturity, that is to say before the stage when eggs were found in the faeces. The African population of Jadotville was found to be infected to about the same extent with both intestinal and vesicular schistosomiasis, which reached 100 per cent. in the riverine population and 50 per cent. in the indigenous city. The incidence of vesicular schistosomiasis in adults was notably high. In Jadotville schistosomiasis is an important problem which may become worse if not controlled and the most effective means of doing this is by systematic treatment of the population.

Schistosoma rodhaini seems to be non-existent in Jadotville for it was not found in 100 wild rodents which were examined nor in mice exposed to cercariae from infected planorbid snails.

J. J. C. Buckley

SCHWETZ, J. *Planorbis tanganikanus* (*Planorbis tanganyicensis*) du lac Tanganika est transmetteur de *Schistosoma mansoni*. [*Planorbis tanganikanus* as a Transmitter of *S. mansoni*] *Ann. Soc. Belge de Méd. Trop.* 1952, Dec. 31, v. 32, No. 6, 665-71.

The author's summary in French is freely translated as follows:

In several previous studies we have given an account of our transmission experiments with *S. mansoni* using cercariae from various kinds of African planorbid snails. In this way we succeeded in infecting mice with cercariae from the small bicarinate snails of Lake Albert, the large unicarinate snail of Lake Kivu and the riverine snail (*Planorbis pfeifferi*) of various sizes from very diverse regions. The rôle of the large snail of Lake Tanganyika (*Planorbis tanganikanus*) still remained unknown and we have just demonstrated that it is also an intermediate host of *S. mansoni*. This work was made difficult for two reasons. The first focus of infected snails proved to be one of *S. rodhaini* instead of *S. mansoni*. The second focus of *P. tanganikanus* was genuinely a *S. mansoni* focus but our experimental mice

died prematurely one after the other and only one survived long enough for the infection to come to maturity.

It may now be said in fact that all the African planorbid snails are transmitters of *S. mansoni*. There still remains, it is true, a species whose rôle in this connexion is unknown, namely, *Planorbis smithi* of Lake Edward. But this species lives, not on the margins of lakes or streams, but attached to aquatic plants some distance from these habitats. It is of no practical importance as an intermediate host. As to its theoretical rôle, its susceptibility to infection is very difficult to investigate on account of its specialized habitat.

J. J. C. Buckley

DE MOURA, S. A. L. Contribuição do Laboratório Regional de Santos na epidemiologia da esquistossomose *mansoni* em Santos. [*Schistosomiasis mansoni*. **Results of Examinations in Santos Laboratory**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1952, v. 12, 97-109. [12 refs.] English summary.

After quoting reports published during the past 30 years on the existence and prevalence of infection by *Schistosoma mansoni* in Santos, São Paulo, the author records his own findings as the result of examinations of faeces at his laboratory and of snails sent there. Four methods of faecal examination were used: (1) direct; (2) after centrifugation; (3) by Faust's method, and (4) by that of Hoffman, Pons and Janer. Between January and October, of 8,917 specimens of faeces, 8,034 (90.1 per cent.) were positive, and of 38,120 *Australorbis* examined during the same period 156 (0.4 per cent.) were infected by cercariae of *S. mansoni*.

The danger, epidemiologically, arises from the fact that many persons immigrate to Santos from the north-east, Sergipe, Alagoas, Bahia and Minas Gerais for work, places where schistosomiasis is common, and their ideas of sanitation are primitive, sanitary conveniences are conspicuously wanting and defaecation is indiscriminate on the ground or in pits with drainage abounding with the molluscan hosts.

H. Harold Scott

TRAVASSOS, L. Algumas observações sobre a bionomia do *Schistosoma mansoni* Sambon, 1907, feitas na Cidade do Salvador, Bahia. [**On the Bionomics of *Schistosoma mansoni* in the Town of Salvador, Bahia**] *Anais Acad. Brasileira de Ciencias*. 1953, June 30, v. 25, No. 2, 157-65, 31 figs. on 4 pls.

Infection by *S. mansoni* is very common among the people of Salvador. The author's observations are confined to the bionomics of the cercariae and experimental infection of animals in the environs of the town. Snails were found infected by cercariae of Echinostomatidae, 2-3 per cent., rarely by those of Plagiorechidae, twice by Strigoidea and once by a Gasterostome. The Planorbidae, however, were infected almost exclusively by those of *S. mansoni*. Observations were made to determine the time in the 24 hours when the cercariae left the mollusc. This has been found in temperate and colder climates to take place in the warm hours, but in tropical climates they emerge at any hour of the day or night, and they would infect experimental mice up to 19 hours later. The author concluded that in Salvador man might be infected at any hour of the day or night from October to March. Taking the movement of the water to be 1 metre per minute, in 19 hours the cercariae would have travelled about a kilometre and this suffices to explain cases of infection of man at this distance from

the mollusc beds; in other words, local absence of the snails does not exclude infection by the cercariae.

The author next turned to the question of infection of the local wild animals, especially those near human dwellings. In Salvador, opossums are common (*Didelphys marsupialis aurita*). These animals were maintained in captivity only with difficulty, but they proved to be easily infected by the cercariae of *S. mansoni* and they were shedding ova with living miracidia in 50–60 days; they could, therefore, be infected under natural conditions and could easily disseminate the disease.

Lastly, examination of the worms themselves showed them to possess a varying number of "testicular follicles", from 3 to 13, though most had 6 to 8. Sketches are given of 31 dispositions of them, varying not only in numbers but also in the groupings.

H. Harold Scott

STANDEN, O. D. **The Relationship of Sex in *Schistosoma mansoni* to Migration within the Hepatic Portal System of Experimentally Infected Mice.** *Ann. Trop. Med. & Parasit.* 1953, June, v. 47, No. 2, 139–45. [21 refs.]

The migratory habits of schistosomes are important because of the effects of drugs upon the distribution of the worms in the hepatic portal system and the significance of distribution as a measure of therapeutic activity.

The author records the migratory habits of unpaired males and females of *Schistosoma mansoni* and the effect of pairing on worm distribution within the hepatic portal system of experimentally infected mice. He followed the distribution of worms in the mesenteric veins, portal vein and liver in (a) all-male infections and (b) after the superimposition of female infections on established all-male infections. Similarly, all-female infections and male crosses to established female infections were observed and compared. The following results were obtained:—

(1) When an established infection of one sex was crossed with cercariae of the opposite sex, bisexual infections developed; no immunity to reinfection was observed within 6 weeks after initial infection of the mice.

(2) In all-male infections a variable proportion of the worms migrated to the mesenteric veins by the tenth week; no such migration was observed in all-female infections. It seems, therefore, that the male worm possesses the migratory impulse which is largely absent in the female. When a female infection was superimposed on an all-male infection, the migratory impulse of the worms was greatly stimulated when the females became sexually mature.

(3) In all-female infections the worms remained immature until a male infection was introduced, when those females which came into contact with males rapidly reached maturity and migration of paired worms to the mesenteric veins soon occurred.

It is concluded that provided the male worms are physically capable of migration, though not necessarily sexually mature, the essential factor controlling the time of migration of paired worms from the liver to the mesenteric veins is the attainment of sexual maturity by the female worms.

(In order to obtain unisexual infections in mice, the author first established unisexual infections in *Australorbis glabratus* by exposing snails to single miracidial attack by *S. mansoni*. In this connexion he draws attention to the ill-founded conclusion of some workers that schistosome cercariae that are discharged from a single naturally infected snail are all of one sex; this statement is true only when the snail has been exposed to a single miracidium.)

R. B. Griffiths

RUIZ, J. M. Schistosomose experimental. 1. Receptividade de *Procyon cancrivorus* à infestação pelo *Schistosoma mansoni*. [**Experimental Schistosomiasis. 1. Receptivity of *Procyon cancrivorus* to the Infestation by *Schistosoma mansoni***] *Mem. Inst. Butantan*. 1952, v. 24, No. 2, 111-13.

The English summary appended to the paper is as follows:—

“Two adults of *Procyon cancrivorus* Wied were experimentally infected by *Schistosoma mansoni*.

“Viable eggs are found in stools 52 to 54 days after exposure to infection and are evacuated regularly during the observation time.

“One example was sacrificed and examined 73 days after infection and only 2 couples of adult worms were recovered.

“Another example was examined 6 months and 23 days after infection. 175 males and 116 females of adult *S. mansoni* were recovered.”

RUIZ, J. M. & COELHO, Ermengarda. Schistosomose experimental. 2. Hermafroditismo do *Schistosoma mansoni* verificado na cobaia. [**Experimental Schistosomiasis. 2. Hermaphroditism of *Schistosoma mansoni* verified in Guinea-pigs**] *Mem. Inst. Butantan*. 1952, v. 24, No. 2, 115-25, 1 graph & 18 figs. on 4 pls.

The English summary appended to the paper is as follows:—

“Secondary hermaphroditism of male *Schistosoma mansoni* obtained from experimentally-infected guinea-pigs was observed in 48% of the 770 specimens examined.

“On the basis of position and number of ovarian lobes and presence of vitelline glands, several types of this secondary hermaphroditism are established. The two types with only one ovarian lobe were the most frequent, 13 and 15% of the total, respectively.

“There was no apparent relation between the number of testicular and ovarian lobes or presence of vitelline glands. The most frequent number of testicular lobes was 5 or 6 for the series.”

RUIZ, J. M. Técnica de perfusão para a coleta de *Schistosoma mansoni* em animais de laboratório. [**A Perfusion Technique for collecting *Schistosoma mansoni* from Laboratory Animals**] *Mem. Inst. Butantan*. 1952, v. 24, No. 2, 101-9, 9 figs.

The English summary appended to the paper is as follows:—

“1. A perfusion technique for collecting *Schistosoma mansoni* from experimentally infected Guinea-pigs is described.

“2. A new apparatus with alternative perfusion liquids is used for this purpose.

“3. Perfusion is recommended in routine necropsies of animals for verifying general infestations of Schistosomatids. Possibly this new procedure will help to discover probable hosts from human *Schistosoma* species.”

NEWSOME, J. Experiments with some Miracil, Acridine, and Diamidine Compounds on *Schistosoma mansoni* Infections in Baboons. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Sept., v. 47, No. 5, 428-30.

This paper describes experiments carried out on *Schistosoma mansoni* in baboons, or *in vitro* on the adult worms, with 5-amino acridine, 2:5-

diamino-7-ethoxy-aminoacridine (Rivanol), 5-butyl- and 5-heptylaminoacridine, hexamidine (4: 4'-diamidino-diphenoxyhexane), and a new thioxanthone related to Miracil D. Three groups of 3 baboons were used, one animal of each group was hyperinfected with 50,000 to 100,000 cercariae and the remaining 2 of the group with 2,000 to 3,000 cercariae. One group of 3 animals served as control, another was treated with the new thioxanthone, and the third group with Miracil D, at a total oral dosage of 150 mgm./kgm. during 3 days, given twice daily. Both drugs were well tolerated. From the 30th day the course of drug was repeated. Examination was made of rectal scrapings and stools on 3 to 8 occasions, starting 21 days after treatment. When the animals were killed at the 54th day pathological and histological examinations were carried out without significant result.

The new thioxanthone compound, of formula 9-thio-1-azo-5- β -diethylaminoethylamino-8-methylantrone hydrochloride, proved as effective as Miracil D. The 5-aminoacridine, 5-butyl- and 5-heptylaminoacridines were tested against adult worms *in vitro* and showed activity, and Rivanol was tested in baboons at a daily dosage of 400 mgm. for 5 days but was ineffective. Hexamidine at maximal dosage in baboons was also ineffective.

J. D. Fulton

SCHWETZ, J. Sur un troisième foyer de *Schistosoma rodhaini* Brumpt au Congo Belge. [**A Third Focus of *S. rodhaini* in the Belgian Congo**] *Ann. Soc. Belge de Méd. Trop.* 1952, Dec. 31, v. 32, No. 6, 673-7.

The author's summary in French is freely translated as follows:—A third focus of *Schistosoma rodhaini* was found at Sakania, a small indigenous community provided with a railway station, situated 225 km. south of Elisabethville.

Eggs and adults of *S. rodhaini* were found there, in mice infected from planorbid snails from the solitary river Lubembe as well as in wild rodents from the banks of this river.

In Elisabethville and Albertville the foci of *S. mansoni* and *S. rodhaini* are separated from each other, but in Sakania these two infections are mixed all along the length of the river section involved. [See also this *Bulletin*, 1953, v. 50, 429.]

J. J. C. Buckley

OLIVIER, L. **Observations on the Migration of Avian Schistosomes in Mammals previously unexposed to Cercariae.** *J. Parasitology.* 1953, June, v. 39, No. 3, 237-46, 20 figs on 3 pls.

After repeated exposure of human skin to avian schistosome cercariae, a papular dermatitis which is an allergic response of the host usually results; in such cases the cercariae remain in the epidermis and are rapidly destroyed there. After initial exposure, however, little or no skin reaction occurs and the author states that such absence of reaction suggests that in unsensitized persons the cercariae might not stop in the skin but might migrate into other parts of the body.

This paper extends the author's earlier studies on the survival and migration of avian schistosomes in abnormal hosts, namely laboratory mammals, previously unexposed to cercariae. In mice which were exposed to *Trichobilharzia stagnicolae*, *T. ocellata* and *T. physellae*, penetration of the skin was followed by migration to the lungs, and pulmonary haemorrhages resulted. *T. ocellata* cercariae were applied also to the skin of hamsters, guineapigs, rabbits and rhesus monkeys and evidence of

migration of the worms to the lungs and the production of pulmonary haemorrhages was obtained.

In guineapigs no examination for worms was made and only indirect evidence of penetration and migration in the form of lung haemorrhages was found; but in all other experimental animals direct evidence of penetration and migration in the form of live worms recovered from the lung was obtained. The worms which were recovered showed pigment in the caeca, probably derived from ingested blood, but no appreciable growth had taken place. Worms were not found in the lungs more than 5 days after exposure.

In several of the exposed animals small colourless nodules appeared on the lungs closely following the peak of pulmonary haemorrhage. These nodules were interpreted as areas of resolution of haemorrhage and areas of cellular response to dead or dying schistosomes.

Schistosomes were not recovered from the liver of any of the animals.

The author concludes by stating "The fate of these species of schistosomes in unsensitized humans is unknown. However, in view of the experience with the cercariae of *T. ocellata* in rhesus monkeys, it seems possible that exposure of an unsensitized human to bird schistosomes may result in the migration of worms to the lungs and production of petechial haemorrhages there".

R. B. Griffiths

MOMOSE, T., OIKE, K. & MASUSAKI, M. [The Mass Chest Survey of the Paragonimiasis (Part 3)] *Shikoku Acta Med.* 1952, Dec., v. 3, No. 6, 282-3, 2 figs. [In Japanese.] English summary.

In this third study [see this *Bulletin*, 1953, v. 50, 131, 322] chest X-ray examinations were made in Ono and Kamodani villages in Tokushima Prefecture, Japan, in September, 1951. Of 55 persons examined in Ono, none showed eggs in the sputum, but 4 gave positive skin tests for paragonimiasis: in Kamodani, the figures were 4 and 13 out of 44 persons. Of the 21 positive cases, nodular and cystic shadows like those previously reported, were found in 16. One patient showed scattered nodular shadows in both lungs, such as are seen in experimental infections. The authors point out, however, that as the danger of eating raw crabs is "well recognized today", such massive infections of human beings are rarely seen. [See also this *Bulletin*, 1953, v. 50, 634.]

H. J. O'D. Burke-Gaffney

MACY, R. W. First Report of the Human Intestinal Fluke *Heterophyes heterophyes* from a Yemen Bat, *Rhinolophus clivosus acrotis*. [Research Notes.] *J. Parasitology*. 1953, Oct., v. 39, No. 5, 571.

KUHLS, R. Zinn in der Bandwurmtherapie. [Tin for the Treatment of Tapeworm Infections] *Med. Klin.* 1953, Oct. 9, v. 48, No. 41, 1511-14. [24 refs.]

The author briefly reviews literature on the treatment of tapeworm infections with filix mas and atebirin [mepacrine] and on the toxic effects of these remedies. He then refers to the work of various authors who have used tin. Formerly tin played a striking part in treatment of these infections, but was given up, perhaps because the tin used was contaminated with arsenic and lead; and some authors claimed that they had shown the development of resistance by the tapeworms against tin. When tin is used

very active proglottides of the tapeworms are passed out on the third or fourth day after treatment; but the head has never been found and it is supposed that the tin is toxic to the head and the budding zone of the worm and that these parts are destroyed by the digestive juices. HIRTE [this *Bulletin*, 1951, v. 48, 1134, and *Deut. med. Woch.*, 1952, v. 77, 160] treated 110 patients and found no toxic effects and practically no contra-indications for the treatment. During a follow-up of 54 patients for 3 months only 2 of them again passed proglottides. Usually when treatment fails proglottides reappear in 2 to 4 months.

The author continued the work of Hirte and followed up some of his patients for as long as 3 years. He treated 202 patients, all of whom were infected with *Taenia saginata* except 3 infected with *T. solium* and 2 infected with *Diphyllobothrium latum*. Results were equally good with all these 3 species of tapeworm. Of the 202 patients, 130 were female and 72 were male. The youngest was 9 years old and the oldest 82 years old. Of the 202 patients, 180 did not again pass proglottides and among these were the 12 children treated. The author considers that there are special advantages in treating children with tin, because treatment of them with other remedies is difficult. The 180 patients who did not again pass proglottides were observed for periods varying from 3 to 36 months. Sixteen others did, however, pass proglottides 2 to 4 months after treatment. Repetition of the treatment cured 4 of these and it was shown that 6 of them had acquired new infections. These last are discussed in some detail. When the treatment failed proglottides reappeared with regularity 2 to 4 months after treatment. Some patients were treated as ambulant cases and some were not. There was no advantage in keeping patients non-ambulant. The treatment did not interfere with the work of the ambulant patients.

The preparation of tin used was similar to that developed by Hirte (*loc. cit.*). It contained metallic tin, oxide of tin and a small amount of zinc chloride. [The amounts of these are not stated.] One tablet was given 3 times a day after meals for 5 days, but the effect of the tin was increased if it were given before meals. In 2 cases which relapsed the patients were given 2 tablets 3 times a day for 5 days without ill effects. A saline purge is not absolutely necessary, because successful treatment of 3 patients occurred without this purge. As Hirte also found, there were no serious ill effects. Of the 202 patients treated, 132 (65 per cent.) reported no trouble. Among the others there were relatively unimportant symptoms, discussed in some detail by the author. The author also discusses various conditions found in the patients, among which were gastric ulcer, anaemia, cirrhosis of the liver, diabetes, and thyrotoxicosis, but, in spite of these conditions, the tin had no ill effects. Nor did examination of the blood, urine and sera reveal any ill effects. There are thus, as Hirte reported, practically no contra-indications. Because tin is not toxic, it can be recommended for the diagnosis of doubtful cases, and the need for diagnosis before giving other remedies does not exist.

G. Lapage

WIGAND, R. & WARNECKE, W. Über Bandwurmkuren (*Taenia saginata*). [On the Treatment of Tapeworm Infections (*Taenia saginata*)] *Deut. med. Woch.* 1953, Oct. 30, v. 78, No. 44, 1493-4.

The authors argue that intestinal worms live under anaerobic conditions, and they therefore treated patients infected with tapeworms by introducing air into the duodenum. They introduced the air by means of a sound lying in the descending limb of the duodenum, in graded quantities of 50 to 300 cc. during periods of 15 to 60 minutes. They compare the results of

insufflation of air alone with those of insufflation of air combined with treatment with Filmaron [a preparation of male fern], "benzin-emulsion" and atebirin [mepacrine]. Insufflation of air cannot be combined with treatment with carbon tetrachloride, because toxic oxidation products are then readily formed. Of the 87 patients, aged 4 to 64 years, treated by these methods, all were infected with *Taenia saginata*. Among them were 7 boys and 7 girls, who took the air-treatment well, receiving from 1.8 to 21 litres of air over a period of 8 days. The average total amount of air insufflated was about 6 litres, the intestines being empty and the diet light. Treatment with air was suspended at night. The results are shown in a table. In all, 51 patients had drug treatment alone—Filmaron, carbon tetrachloride or "benzin-emulsion"—and 41 per cent. were cured. The remaining 36 had oxygen insufflation, with or without medication, and 75 per cent. were cured.

G. Lapage

PERRONI, G. B. & PANCALDO, A. Sulle alterazioni elettrocardiografiche nell'anchilostomiasi. (Contributo allo studio della patogenesi.) [**Electrocardiographic Changes in Ankylostomiasis. Contribution to a Study of their Pathogenesis**] *Acta Med. Italica*. 1953, Aug., v. 8, No. 8, 206–10, 9 figs. English summary.

A large number, over 100, of electrocardiographic tracings are reproduced, made from patients infected with hookworms and complaining of weakness, palpitation and oedema and suffering from symptoms of anaemia and cardiac irregularity. Discussing the pathogenesis, the authors come to the conclusion that the effects are due to a toxic myocarditis caused by the presence of these nematodes, since adequate treatment of the infection cures the symptoms.

H. Harold Scott

CARVALHO, J. C. & CORRÊA, M. O. A. Considerações em torno da ocorrência de ovos de nematódios da família Heteroderidae em fezes humanas. [**On the Presence of Ova of Heteroderidae in Human Faeces**] *Rev. Inst. Adolfo Lutz*. São Paulo. 1952, v. 12, 13–25, 7 figs. English summary.

This article will interest mainly the systematist for much of it is taken up with discussion of the nomenclature. The worms themselves cause galls and small tubercles on various plants which are eaten by man, and although they are not human parasites their ova are not infrequently passed in the faeces. During the decade 1942–51 there were examined at the Adolfo Lutz Institute 75,622 specimens of faeces, and worms (or their ova) were found in 46,540 (61.5 per cent.) and these ova in 833 (1.7 per cent.) of those with worms of some sort and in 1.1 per cent. of the total examined. The worm is perhaps commonest in the potato (*Solanum tuberosum*) which is sown in mid-August to mid-October and again in January–March. The former sowing is more often attacked by the worm because it is the rainy season for collecting. It is found also in carrots (*Daucus carota*), mangarito (*Xanthosoma sagittifolium*), sweet potato (*Ipomoea batatas*), manioc (*Manihot utilissima*), yam (*Dioscorea illustrata*), *Calocasia antiquorum*, beetroot (*Beta vulgaris*), radish (*Raphanus raphanistrum*), celery (*Apium graveolens*), turnip (*Brassica napus*) and others. CARVALHO in 1951 (*Arquivos Inst. Biológico, S. Paulo*, 1951, v. 20, 165) gave a list of 35 plants parasitized.

Its life-history is described and illustrated and an interesting account is given of its nomenclature. It appears to have changed its name as often

as a fashionable movie-star, from *Oxyuris incognito* to *Heterodera radiculicola*, *H. marioni*, *Anguillula radiculicola*, *Ditylenchus radiculicola* and *Meloidogyne exigua* and the authors conclude by saying that "Researches made in São Paulo (Brazil) show that all nematodes responsible for galls in edible roots and tubercles belong in the genus *Meloidogyne*. It becomes clear that the eggs previously described as being of *Heterodera marioni* and found in human stools should be henceforth classified as eggs of *Meloidogyne* sp".

H. Harold Scott

STAUFFER, H. Die Bedeutung der Askariden-Infektion für die dermatologische Praxis. [The Importance of *Ascaris* Infection in Dermatological Practice] *Dermatologica*. 1952, v. 105, Nos. 4/5, 203-12.

The English summary appended to the paper is as follows:—

"On the basis of much experience gained in his practice, the author lays much greater weight on the importance of ascaridis infestation than has as yet been given to it. With examples, he distinguishes on the one side true ascaridic exanthemas which are directly caused by the worms. Besides the well-known urticaria and pruritus, he adds a whole series of different skin disturbances including many with eczematoid character. All exanthemas of this type are characterised by a certain polymorphy and by special atyp as regards the form of appearance and the localisation. On the other hand ascarides can also have different importance genetically in dermatoses in that they modify their appearance and their progression in an unfavorable way. Furthermore they can also predispose to a sensitisation against other influences, or even create such a sensitisation. It is striking how often such very persistent dermatoses are promptly cured by a successful worm cure on demonstration of worm eggs in the faeces."

WAKAYAMA, S., AWAKAWA, S. & SATO, N. [On the *Ascaris*-Exterminating Effect of *Ascaridole* (*Shin-Nematole*) to Relatively Aged Persons] *Sapporo Med. J.* 1952, Feb.-Apr., v. 3, Nos. 1/2, 67-70. [Refs. in footnotes.] [In Japanese.]

The English summary appended to the paper is as follows:—

"A study on the virtues and secondary reactions of purified ascaridole applied to relatively aged persons has been conducted with the following results.

"Worm discharge rate	...	...	...	...	89.0%
"Complete discharge rate	...	...	...	...	57.7%
"Secondary reactions	...	...	...	...	19.8%

"The main objective was in the secondary reactions and as a result of this study we find we have no grounds to ban the application of this drug."

CAPOCACCIA, L., MASTRANDREA, G. & MORESCHI, R. L'uso di un vermicide a base di fermenti proteolitici vegetali nell'infestazione da ascaridi. [A Proteolytic Vegetal Enzyme as an Ascaricide] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1953, Sept., v. 34, No. 9, 473-84. [22 refs.] English summary (4 lines).

A German preparation, Vermizym-Schwab, is a proteolytic vegetal enzyme containing papain. Tested *in vitro* on *Ascaris* the worms become motionless in 15 minutes; in 45 minutes vesicles appeared on their surface and the worms were seen to swell and disintegrate. Pastilles were made up

containing 208 mgm. of papain with cysteine hydrochloride 6, extract of dried yeast 90, potassium ferrocyanide 16, calcium carbonate 10.71, talc 6.12, sugar 17.85, gum arabic 2.55 mgm., for use in human infections. The evening before treatment proper was started a light meal was taken and 2 hours later a laxative. The next morning before any food 5 pastilles were taken every hour for 5 hours (25 pastilles) and an hour later 2 laxative tablets. This procedure was followed for 3 days. If the first course was not effectual, a second was given after a week's interval.

Thirty-seven adult patients were thus treated; 19 were cured by the first course and 6 more after the second. None showed any toxic symptoms. Thirteen children aged 5 to 10 years were given the drug in powder form in a teaspoonful of coffee and 2 more spoonfuls $1\frac{1}{2}$ hours later, followed after another 2 hours by a laxative tablet. This procedure was also carried out for 3 days and 7 of the 13 were freed from their infection. Those still positive were given a repetition of the treatment, but this time for 5 days instead of 3; 2 more were cured. The patients were regarded as cured if the eosinophilia fell, no ova were seen in the faeces and no worms by radiograph.

H. Harold Scott

NOZAWA, Y. [A Report on Studies of Anthelmintic Actions of Principles of Volatile Oils. I. Action on Pig *Ascaris*] *Sapporo Med. J.* 1952, Feb.-Apr., v. 3, Nos. 1/2, 48-53. [Refs. in footnotes.] [In Japanese.]

The English summary appended to the paper is as follows:—

"The ascaricidal properties of 28 compounds originating in volatile oils were examined with ascarids of the pig in vitro. The compounds were administered in concentration of 1/1000.

"1. Chlorthymol, carvacrol, dihydroeugenol, thymol, geraniol, and menthol all showed strong ascaricidal properties; chlorthymol was especially effective against pig ascaris, while p-cymol showed a very slight degree of activity.

"2. While certain compounds first stimulated the movement and later paralysed the worms, others simply paralysed them.

"3. The compounds were divided in two groups; one stiffened and the other relaxed the worms after cessation of their movement.

"4. When the spontaneous movement of the worms ceased, they were replaced in newly prepared Bunge's solution. The worms revived except in the case of thymol, chlorthymol, carvacrol, chlorearvacrol, and chenopodium oil."

JORDAN, P. **Filariasis in the Southern Highlands Province of Tanganyika.** *East African Med. J.* 1953, Sept., v. 30, No. 9, 361-7. [10 refs.]

A filarial survey was made in the Southern Highlands Province of Tanganyika during September and October, 1952. The Province is roughly triangular, the southern apex being formed by the northern end of Lake Nyasa: the eastern side by the Highlands, extending from Iringa to the lake, the west side by the low-lying area around Lake Rukwa. The central part of the triangle is mainly undeveloped. Average temperatures follow the contour roughly, being in most places between 75° and 80°F.

For Bancroftian filariasis blood was taken in the evening between 8 and 11 p.m., but it is probable that the rates would have been higher had the blood been taken after midnight. Some difficulty was experienced in taking night blood owing to African suspicion.

As the microfilarial incidence varies so much according to sex and age in

East Africa it was decided that the criterion in a village should be the incidence of microfilariae in the blood of adult males over the age of 16. The microfilariae in approximately 30 cmm. were counted.

With 2 exceptions (one near Lake Nyasa and one in the Iringa-Mbeya-Njombe area) *W. bancrofti* infection does not occur in the Southern Highlands Province. It is thought that the Lake Nyasa focus [this *Bulletin*, 1941, v. 38, 146, 522; 1951, v. 48, 1027] is limited to a radius of about 16 miles from the lake, at the foothills of the Mporoto Mountains. As the area is so localized it would be suitable for Hetrazan [diethylcarbamazine] and antifilarial measures. The second endemic focus has not previously been described. The filarial rate in adult males at Kimande in the Iringa district was 24 per cent. The village is situated near an extensive swamp about 40 miles north-north-west of Iringa. At Rujewa (Mbeya District) a filarial incidence of 4 per cent. was found. The relatively high rate of 8 per cent. at Lugarawa in the Njombe district is surprising considering the climatic conditions and the relatively low temperatures recorded there.

In a search for onchocerciasis, 586 males were examined for nodules, with a negative result. Three hundred and thirty were given 3 mgm. diethylcarbamazine per kgm. body weight. None experienced the immediate and intense pruritus which LAURIE [this *Bulletin*, 1953, v. 50, 45] has described as a sequel to this drug in onchocercal infection. Pupae of Simuliidae were found at Njombe and Lugarawa and also on rocks in fast-flowing streams in Rungwe District, the former collections including *S. damnosum*. It is suggested that *S. naevei* and *S. damnosum* have a wider distribution than is known at present. Although these 2 species are numerous in Njombe (5,600 feet), onchocerciasis is rare there.

The finding of two cases of *D. perstans* at Kibau probably represents a non-indigenous infection.

Philip Manson-Bahr

KARTMAN, L. **An Observation on the Loss of Microfilariae from the Mosquito Host during its Infective Meal.** [Research Notes.] *J. Parasitology*. 1953, Oct., v. 39, No. 5, 571-2.

In the course of studies of infection of mosquitoes with *Dirofilaria immitis* [this *Bulletin*, 1953, v. 50, 835], the author observed regularly that *Anopheles quadrimaculatus* had the habit of expelling droplets of blood-tinged plasma from the anus during satiation feeding.

He therefore collected individually in capillary pipettes the droplets thus expelled in the case of 31 *A. quadrimaculatus* females. The droplets were mixed with saline in the pipette, the mixtures examined microscopically and the microfilariae found in the droplets were recorded: the number of microfilariae in the mid-gut were also counted.

The numbers of microfilariae found per anal droplet varied from 0 to 8 and the percentage loss of parasites per mosquito was from 0 to 17. Of 1,599 microfilariae counted, 1,487 were found in the mid-guts, while 112 (7 per cent.) were found in the dejecta. Over 35 years ago MITZMAIN had noted [this *Bulletin*, 1918, v. 11, 32] that various *Anophelines* may eject several droplets during the first 24 hours after feeding, and that gametocytes of malaria were thus eliminated. The present author argues that if this applies in the experiments described by him, the loss of parasites may have been even greater than he had recorded: but adds that as that microfilarial migration from the mid-gut of *A. quadrimaculatus* is quite rapid, the quantitative significance would depend in this case upon how soon additional droplets were ejected. In any case, the loss of parasites in this way is probably not significant as far as the host efficiency of *A. quadrimaculatus*

is concerned, since it is known to be a very favourable host for *D. immitis*. [These observations are of special interest in view of the findings of REID in Malaya, abstracted in this *Bulletin*, 1953, v. 50, 434, who noted such a loss of microfilariae of *W. bancrofti* in the blood ejected from the anus of *A. barbirostris*, while *Mansonioides annulifera*, chief vector of *W. malayi*, which voided only clear fluid, ejected no microfilariae in this way. In a personal communication to the present abstracter, Dr. Kartman has pointed out that he was unaware of Dr. Reid's work before his own had gone to press.]

H. J. O'D. Burke-Gaffney

HOLSTEIN, M. Enquêtes sur l'onchocercose le long de la Volta noire (1950).

[**Studies of Onchocerciasis along the Black Volta (1950)**] *Bull. Soc.*

Path. Exot. 1953, v. 46, No. 3, 329-34, 1 map.

The investigations of PUYELO and HOLSTEIN [this *Bulletin*, 1952, v. 49, 71] along the White and Red Volta have been followed by the discovery of numerous sites of onchocerciasis on the Upper Volta and in the French Sudan. The author here reports on onchocerciasis and on the distribution of *Simulium damnosum* in the Bobo-Dioulasso area on the Black Volta. A map shows the areas investigated.

The author confined himself to noting filarial cysts and their localization on the body, but on one occasion microfilariae were demonstrated by scapular scarification and the percentages then obtained were higher. Ocular lesions were not included, because many of them had other causes, but the cases of blindness were noted.

Four riverine villages of the Black Volta were studied and 866 individuals were examined, among whom 53.5 per cent. of the men, 43.6 per cent. of the women and 16.6 per cent. of the children were infected; but the incidence varied in different localities. Tables give details of the people with cysts and blindness and the localization of the cysts in men, women and children. Cysts in the region of the ribs were more numerous in men than in women, but women had more localized in the iliac and trochanter regions. Puyelo and Holstein (*loc. cit.*) found that, in the Tenkodogo region most of the cysts were at the level of the iliac crest (53.6 per cent. in men, 80.86 in women, 84.14 in children), but in the Bobo-Dioulasso area the cysts were about equally distributed in the region of the ribs and iliac crest, much as HUGHES and DALY [this *Bulletin*, 1952, v. 49, 168] found on the Black Volta in the southern Gold Coast. In the Gold Coast 23 per cent. of the cysts were found on the knees, while in the Bobo-Dioulasso area 0.7 per cent. of the cysts were found on the knees. A possible reason for this is the protection afforded to the legs in the latter area by the clothes habitually worn by the men and women.

In April-June, when the enquiry was made, *Simulium damnosum* were very numerous. This species was practically the only adult species encountered, but larvae of *S. unicornutum* and *S. alcocki* (along the western Lerata) and those of a species not certainly identified were found. Hughes and Daly (*loc. cit.*) noted the association of *S. damnosum*, *S. griseicollis*, *S. unicornutum* and *S. alcocki* var. *violaceum*. Along the White and Red Volta no typical vegetation could be noted. On the banks of the Black Volta *S. damnosum* was captured on shores prepared by riverside dwellers for easier access to the water and only 20 per cent. were found in the vegetation on the banks (species of *Mimosa*, *Syzygium*, *Pterocarpus* and *Morelia*). The Simuliids were very aggressive and bit practically all day, although they were less numerous during the hottest hours, but they were still frequent in moonlight. They enter houses 600 metres from the river. The parts of the body most often attacked are (in the following order) the

leg (ankle and knee), the thigh up to the hip, the forearm and elbow, the back and, very rarely, the nape of the neck. Of the 243 *Simulium* dissected, 18.5 per cent. were infected with microfilariae and 2.8 were infective. The presence of these insects along the Eastern and Western Leraba, the Comœ and a certain number of rivers of the Volta network suggests that extension of onchocerciasis is much wider than was thought and that the infected areas along the Black Volta extend largely towards the Sudan and the Ivory Coast.

G. Lapage

ROUSSET, P. Essai de prophylaxie et de traitement de la dracunculose par la notézine en Adrar. [Trials of Prevention and Treatment of Guinea-worm Infection by Diethylcarbamazine in Adrar] *Bull. Méd. de l'Afrique-Occidentale Française*. 1952, v. 9, No. 2, 351-68.

Guineaworm infection is a serious cause of painful indisposition, and so of economic loss in the province of Adrar [N.E. French Sudan]. In some years about half the population of the village of Atar may be immobilized by it at least for some days and in some cases even for some months. Consideration has therefore been given of a possible chemo-prophylaxis against this infection. In view of the therapeutic efficacy claimed by PUYUELO and HOLSTEIN [this *Bulletin*, 1952, v. 49, 71] for diethylcarbamazine in human onchocerciasis, which is an infection with a small filarial parasite, the author decided to try "notézine" [diethylcarbamazine] treatment in cases of infection with the large filarial parasite *Dracunculus medinensis*. JOYEUX and SICÉ, in the 1950 edition of their book, already had suggested that this drug might be effective against this parasite. Before becoming a large filarial parasite *D. medinensis* is a small one, that is during its latent development in the mammalian host after the initial infection and before its disclosure at least 9 months later as an adult worm causing clinical symptoms. Prophylactic treatment with diethylcarbamazine during this period, therefore, seemed to offer a prospect of success. An experiment was conducted as follows: 31 controls, given an appropriate placebo, were observed from March until October 1951; 31 similar subjects from the same population were given a course of diethylcarbamazine treatment and examined monthly during the same period; 12 of them had a total of 80 tablets (4 tablets daily for 10 days, and repeated after an interval of 10 days); others had only one course of 40 tablets; and yet others had only 20 tablets in a 5-day treatment. All were observed actually to swallow the tablets.

The period March to October for the experiment was dictated by force of circumstance. *Cyclops*, in this locality, is to be found in drinking water only during September, October and November; this is the only period in the year when the human infections take place at Atar. Thus the optimum months for attacking the "microfilariae" in man would be December and January, as the incubation period of the infection in man is from September to April. Cases of clinical dracunculosis make their appearance only between May and September.

Of the 31 controls, 16 had no signs of worms at the time of the experiment, but nearly all stated that they had had numerous guineaworms during the preceding year. Almost every single patient of these 31 said he had lost from 1 to 6 months' work in 1950 and 1951 as a result of the infections; 15 (48 per cent.) of them were observed to suffer from dracunculosis in 1951, and between them they lost 22 months work on account of it during this year.

Of the 31 persons treated with diethylcarbamazine, all with earlier

histories similar to those of the controls, only 2 (6 per cent.) suffered from dracunculosis in 1951; their total loss of time on account of it was only 7 days. These 2 patients had had the 80 tablet dosage.

There were always side-effects of treatment, and sometimes they were distressing; but they were not sufficiently severe in any case to demand stoppage of the treatment. They included slight fever for up to 4 days, nausea, diffuse pains, colic and anorexia, headache and vertigo. Urticarial eruptions occasionally occurred, but there was neither oedema nor adenopathy. Unfortunately at this time the antihistaminic drugs were not available to mitigate the side-effects of the treatment.

In regard to the epidemiology of dracunculosis, the period September–November lies between the end of the rains and the onset of the cool weather. If the rains are prolonged and the cool weather occurs early, as in 1950, there is relatively less guineaworm infection in the following year; the converse is also true, dryness and a longer period of warmth favour the occurrence of the infection, as was evident in 1949 when these conditions occurred. In effect, the later the date of the last tornado the the shorter the period of infectivity of *Cyclops*, as the onset of the cold weather is fairly constant in December. This date also directly influences the time of disclosure of the worms in the following year; a late last tornado is followed by a correspondingly late disclosure of worms in man during the following year. Therefore in such late years the medicinal prophylactic treatment should appropriately be delayed. In other localities in which infected *Cyclops* are present throughout the year it is suggested that the treatment should be repeated 2 or 3 times throughout the year; there is no need for this at Atar where the period of infection is strictly limited and seasonal.

The author concludes that diethylcarbamazine treatment had a marked prophylactic action in dracunculosis when it was given some 6 months after exposure to infection; he believes it would better be given about 3 months after infection, and then might be repeated with advantage about the sixth month after infection. The total dosage he suggests should be 50 tablets during 10 days on the first occasion, and 30 tablets over the second period; or a total of 80 tablets.

Turning to the treatment for the adult worm infection 8 patients, each with visible or palpable adult worms, or oedema or both due to them, were treated with diethylcarbamazine; in most cases rapid resolution of the inflammatory oedema was followed by ready removal of the worms. The dosage of the drug advocated for this purpose should be the maximum possible and about twice the usual dosage; it should be repeated if necessary after a short interval. Some information on the distribution of guineaworm infection in the area and of the chemical content of the local waters is appended.

[The dosage of "notézine" contained in each tablet is not stated (but the usual content is 0.1 gm.). The statements by patients that they had as many as 25, or even 32 worms, in 1950 is not commented on; some photographs of such cases of heavy infection would be of much interest.]

A. R. D. Adams

KEAN, B. H. **The Treatment of Enterobiasis (Oxyuriasis). The Need for a Special Sleeping Garment.** *J. Pediatrics*. St. Louis. 1953, July, v. 43, No. 1, 47–53.

Careful surveys have shown the high incidence of enterobiasis in the United States and Canada. One observer estimated the number of individuals infested to be 18 "million". In Washington, D.C., 35 per cent.

of pre-schoolchildren, 51 per cent. of schoolchildren and 22 per cent. of adults were infested [this *Bulletin*, 1943, v. 40, 618]. The management of enterobiasis is frequently unsatisfactory and "at present many capable physicians are anxious not to make the diagnosis since they feel frustrated about treatment".

This paper sets out the important points in the life history and habits of the parasite, on the knowledge of which treatment must be based. Accurate diagnosis is the first essential and is best achieved by the technique of microscopic examination of a strip of transparent cellulose tape applied to the muco-cutaneous junction of the anus in the morning before a bath, and before a defaecation [this *Bulletin*, 1953, v. 50, 328]. The treatment recommended consists in:—(1) the use of a "seal-in" type of sleeping garment (which is described) which efficiently prevents anal contamination of the fingers, (2) morning shower baths, (3) drug therapy which includes several preparations used in sequence since none given alone is entirely satisfactory: the drugs recommended as reasonably effective and safe when used in series are gentian violet (7 days), terramycin [oxytetracycline] (3 days), Diphenan (parabenzyl phenyl carbamate) (10 days), and hexyl-resorcinol (1 dose but only in children over 2 years of age); a schedule of drug treatment which gives the recommended doses for different ages of patient is given, (4) an anal ointment mildly antipruritic and anaesthetic, such as Perazil (chlorcyclizine hydrochloride), (5) bi-weekly enemas simply for rectal lavage, (6) the usual auxiliary methods of personal and house hygiene, and (7) simultaneous treatment of siblings and playmates.

M. E. Delafield

POOLE, J. B. **The Incidence of Human Trichinosis in Canada.** *Canadian J. Pub. Health.* 1953, Aug., v. 44, No. 8, 295-8. [23 refs.]

The author summarizes earlier literature on this subject and records the results of his own examination, during 1949, 1950 and 1951, of 251 human diaphragms derived from an Ottawa hospital and from Kamloops, British Columbia. All the diaphragms, from both sources, were taken at routine post mortems without regard to clinical or anatomical diagnosis. They were examined by the compressorium and by artificial digestion of about 20-25 gm. of diaphragm in a pepsin solution.

Of the 82 Ottawa diaphragms 7.3 per cent. and of the 169 Kamloops 6.5 per cent. were infected. Among the Kamloops diaphragms were some from Indian and Chinese subjects, but none of these was infected. The age at death was 12 to 83 years. There were about three times as many male diaphragms as female. Of the 11 positives 8 were males and 3 females. All the infections were light, less than 15 larvae per gm. of muscle being found. In nearly 50 per cent. of the positives the cases were partly calcified. The incidence of the infection increased as the age of the patient increased, as WRIGHT *et al.* [*Bulletin of Hygiene*, 1944, v. 19, 201] also found. In the Kamloops group the average age at death of those who were positive was 65.7 years and that of all the group 58.8 years. The author concludes that repeated infections occurred. A table summarizes the author's results and those of others who have studied the incidence in Canada. This table shows an incidence of 1.5 to 4 per cent. of positives in the total of 1,610 cases examined. The author's results show a higher incidence in his material from Ottawa and Kamloops than in the cases studied by others in Montreal (1.5 per cent. of 539), Toronto (1.7 per cent. of 420) and Vancouver (4 per cent. of 400). He refers to the literature recording trichiniasis in the pig, wild rat and polar bear in Canada, with which readers of this *Bulletin* will be familiar.

G. Lapage

MAZZOTTI, L. Trichinosis en México. [**Trichinosis in Mexico**] *Bol. Oficina Sanitaria Panamericana*. 1953, Oct., v. 35, No. 4, 418-20. [12 refs.]

The English summary appended to the paper is as follows:—

"Trichinosis was first identified in Mexico by Toussaint (Barragán, 1893). Perrin (1939) examined 200 human diaphragms by compression of 1 gm of muscle, and found 12% with trichinae. Mazzotti and Chavira (1943) examined 527 diaphragms by compression of 2 gm of muscle and digestion of the rest of the diaphragm, and found 4% positive.

"Mazzotti and Pastrana (1943) demonstrated that a great proportion of calcified trichina cysts is destroyed by the digestion technic. For this reason, Mazzotti (1944) used only the compression technic with 10 gm of muscle in 473 human diaphragms, and found 12% positive. Beck (1953) examined 100 diaphragms by compression of 50 gm or more from each, and found 15% positive.

"Foods are generally well cooked in Mexico; however, there is a kind of sausage, called 'chorizo' which is prepared with raw meat, vinegar and other condiments. Direct microscopic techniques for trichinae in this sausage proved difficult and the procedure of xenodiagnosis was used, by feeding isolated rats with each sample (of about 100 gm) of 'chorizo', during 3 to 6 days; the animals were kept on a regular diet for one month; then they were killed and the muscles examined for *Trichinella*. Among 211 samples received from different localities, two developed *Trichinella spiralis* in rats (Mazzotti, 1948).

"In the city of Mexico cats are heavily infested (30%); hogs show a low percentage (0.03%) of infestation."

ROSS, Winifred M. **A Preliminary Comparative Study of Test Antigens prepared from Adult and Larval Forms of *Trichinella spiralis***. *Canadian J. Med. Sci.* 1952, Dec., v. 30, No. 6, 534-42, 2 figs. [11 refs.]

"Test antigens prepared respectively from adult and from larval *Trichina* were compared by means of the complement fixation test on serum from rabbits infected experimentally with varying numbers of Trichinae. While significant levels of reactivity with 'adult' antigen were shown to occur, it had no apparent advantage over the 'larval' antigen in the early detection of antibodies."

GOMBERG, H. J. & GOULD, S. E. **Effect of Irradiation with Cobalt-60 on *Trichina* Larvae**. *Science*. 1953, July 17, v. 118, 75-7, 2 figs.

The authors refer to earlier work on the effects of irradiation with cobalt-60 on the larvae and adults of *Trichinella spiralis*. GOULD *et al.* [this *Bulletin*, 1953, v. 50, 642] have shown that a dose of 750,000 r kills the larvae *in vitro*, whereas a dose of about 5,000 r inhibits maturation of the larvae to the adult stages and a dose of about 3,500 r causes sexual sterility of adults that mature from irradiated larvae. For the technique employed by the authors in the work recorded in this paper and for the results obtained, the paper itself must be consulted. Work is proceeding on the irradiation of pork as a possible means of controlling trichiniasis. Preliminary tests have shown that there is only a negligible change in the flavour of pork irradiated with doses up to 38,400 r and a dose of 20,000 r is more than enough to prevent maturation of encysted larvae. *G. Lapage*

DEFICIENCY DISEASES

AMERICAN GEOGRAPHICAL SOC. **Study in Human Starvation. 1. Sources of Selected Foods.** *Atlas of Diseases.* Plate 8 (3 coloured maps on folding pl.). [Numerous refs.] 1953.

The folder, which can be obtained from the American Geographical Society, Broadway 156th St., New York 32, N.Y., price \$1.25, sets out on maps the distribution of the principal food crops of the world. Tables record food supplies *per caput* per day in the principal countries, the nutrient composition of the main food crops and the production of selected foods by countries. Most of the data are drawn from FAO publications.

Dr. MAY, whose work on the maps of this series is well known [this *Bulletin*, 1953, v. 50, 109, 174, 426], is head of the American Geographical Society's Department of Medical Geography. He has concentrated with no great sacrifice of accuracy a great mass of information into a form which may prove useful to teachers in senior classes at school or junior classes at the University.

R. Passmore

AMERICAN GEOGRAPHICAL SOC. **Study in Human Starvation. 2. Diets and Deficiency Diseases.** *Atlas of Diseases.* Plate 9 (6 coloured maps on folding pl.). [Numerous refs.] 1953.

This folder, which can also be obtained separately for \$1.25 (*vide supra*) attempts to set out the epidemiology of human deficiency diseases. Here Dr. MAY has attempted an impossible task. The data which he has collected covering all varieties of deficiency diseases just cannot be compressed into 6 maps. Inevitably the attempt involves numerous inaccuracies and the general effect is so confusing that it is not possible to recommend their use.

R. Passmore

NICOL, B. M. **Food, Population and Health in West Africa.** *West African Med. J.* 1953, July-Aug.-Sept., v. 2 (n.s.), No. 3, 109-13. [10 refs.]

By contrast with countries such as India and China, West Africa is not overpopulated and levels of nutrition of the people are reasonably good. The population is increasingly following the application of modern methods of preventive medicine. But owing to the expansion of cash-crop farming and mining and the increasing number of clerical workers, the proportion of food-producing rural peasants to the total population is decreasing. Thus the future food supply is uncertain. Unless West African communities concentrate their available resources upon producing a varied and adequate diet for all, the indiscriminate application of preventive medicine will result in "increasing deprivation and disturbance".

R. Passmore

BERGOUNIOU, J. L. Malnutritions et sous-nutritons observées chez les jeunes enfants de la région de Ouahigouya (Haute-Volta). [**Malnutrition and Undernutrition in Young Infants in the Region of Ouahigouya (Upper Volta)**] *Bull. Méd. de l'Afrique-Occidentale Française.* 1952, v. 9, No. 2, 239-58.

A clinical examination of 593 children was made. In all 135 were found to have stigmata of deficiency diseases. Follicular hyperkeratosis was common, and kerato-conjunctivitis, cheilosis and brown hair were also

found. Out of 125 children with enlarged livers, 112 also had enlarged spleens and it is concluded that malaria was responsible for both. There was no accompanying oedema and no case of kwashiorkor was seen. An account of the agricultural production of the region is given. At the moment barely sufficient is produced for the inhabitants. With the aid of agricultural and other services the country could be transformed and more abundant food of better quality produced.

R. Passmore

NICOL, D. **A Pilot Nutrition Survey in Nigeria.** *West African Med. J.* 1953, July-Aug.-Sept., v. 2 (n.s.), No. 3, 123-8, 1 diagram.

A clinical survey of 316 persons, including 200 children under 14, was made in the Western Region of Nigeria. Stigmata of malnutrition such as photophobia, lachrymation, hyperaemia and excess tissue in the conjunctiva, dyssebacia, angular stomatitis, cheilosis, atrophy of the tongue papillae, crackled skin and follicular keratosis were each found in at least 10 per cent. of the group. These signs are discussed in relation to the reported dietary habits of the people.

R. Passmore

MERLE, F. La glossite épidémique saisonnière au Congo. [**Seasonal Epithelial Glossitis in the Congo**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 3, 474-80, 1 graph.

In Brazzaville during the dry season (June, July and August) there is regularly an epidemic of glossitis. The tongue only and no other part of the alimentary tract is affected. The condition usually disappears spontaneously. The origin of the disorder is probably dietary. The principal food is manioc and during the dry season the supply of fish is reduced. There is then an insufficiency of both protein and vitamins in the diet.

R. Passmore

BRONTE-STEWART, B. **The Anaemia of Adult Scurvy.** *Quart. J. Med.* (n.s.) 1953, July, v. 22, No. 87, 309-29, 6 figs. [65 refs.]

The author studied 32 adult Bantus who were admitted to a hospital in Cape Town with the diagnosis of scurvy. A series of 13 patients admitted consecutively were subjected to an intensive analysis. They were all anaemic. One subject died of coronary thrombosis shortly after admission. Great care was taken that no unprescribed ascorbic acid reached the patients, each was given the diet on which he had developed the disease, the staple diet of the Bantu in South Africa: maize, porridge without milk or sugar, "stamped" maize, bread without jam or butter, and black tea or coffee. The ascorbic acid content of this diet was zero. Two patients received ascorbic acid within 24 hours of admission, 2 after 2 days and the others were subjected to a control period varying from 4 to 30 days. During this control period the patients received folic acid by mouth, parenteral vitamin B₁₂, intravenous iron and parenteral vitamin B complex. Sufficient time was allowed between the treatments to observe any haematological response. At the end of the control period 1 gramme ascorbic acid was given every day intravenously, and the ordinary full hospital diet was not allowed until the packed red cell volume had risen above 40 per cent. With all these precautions it was possible to demonstrate clearly that the anaemia of scurvy responded specifically to ascorbic acid treatment.

The anaemia was found to be normochromic and normocytic except in a few of the severe cases, in which it was macrocytic. Reticulocytes were

present in increased number in all severe cases provided they were kept at rest. The bone-marrow was cellular but showed decrease in mitoses. There were occasional megaloblasts. When faecal urobilinogen was increased this was due to the absorption of haematomata rather than to increased intravascular haemolysis.

H. Lehmann

JELLIFFE, D. B. **Infant Feeding among the Yoruba of Ibadan.** *West African Med. J.* 1953, July-Aug.-Sept., v. 2 (n.s.), No. 3, 114-22. [15 refs.]

Breast feeding is continued until at least 2 years of age and often longer. Yields of mothers' milk are low in the second year of lactation and some infants were getting as little as 4 ounces per day from the breast. This is supplemented at ages beginning from 4 to 18 months onwards with maize gruel, boiled yam, bread, boiled rice and cassava meal gruel. Fresh cow's milk is unobtainable and goat's milk is never drunk, but as many as 13 per cent. of children were getting some preparation of condensed or dried milk. Kwashiorkor is certainly the commonest and most serious nutritional disease of children. Cancrum oris is not uncommon and undoubtedly has a nutritional basis. Although the organization of adequate supplies of meat, fish and milk would take decades, numerous minor but important modifications of the present Yoruba infant diets could be effected at once.

P. Passmore

VAN OYE, E. La courbe de Price-Jones dans la malnutrition et dans la dénutrition (= kwashiorkor) en Afrique. [**The Price-Jones Curve in Malnutrition and Kwashiorkor in Africa**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 4, 611-18, 2 figs.

When the Price-Jones curve of red cell diameter distribution is constructed for young infants in Central Africa a peak is found at about 7 μ . Although this is the case at the age of about 2 years, in adolescence (at about 15 years) 2 peaks are discovered, both of equal height, one at 7 μ , one at 8 μ ; the second denotes the presence of macrocytes caused by liver damage. With advancing age the second peak becomes larger and in adults most cells belong to the macrocyte type with a minor population of normal cells still persisting. These 2 peaks, 7 μ for normal cells, 8 μ for cells of malnutrition, are joined by a third in the kwashiorkor syndrome, at 9 μ . There cells are the megalocytes caused by a pathological condition of the bone-marrow distinct from that producing the ubiquitous macrocytes seen as a second peak in Africans with liver damage. [This article is primarily a summary and the reader is thus denied an insight into the work which preceded such conclusions.]

H. Lehmann

CLOSE, J. Etude électrophorétique des protéines sériques de cas de Kwashiorkor. [**Electrophoretic Study of Serum Proteins in Kwashiorkor**] *Ann. Soc. Belge de Méd. Trop.* 1953, June 30, v. 33, No. 3, 185-202, 16 figs. [19 refs.]

The serum proteins have been studied by the micro-electrophoretic method, protein content being calculated from refractive indices, according to the method of Antweiler. Cases of kwashiorkor in the Belgian Congo were examined comprising 15 children 1½ to 4 years of age and one adult. In comparison with normal individuals the serum albumin was considerably

lowered (to about 1.1 gm. in 100 cc.). There was a marked increase in alpha-globulin, a slight increment in beta-globulin and a slight diminution in gamma-globulin. The A/G ratio was usually below 0.5.

The change in serum-protein values was also followed through treatment up to cure. A regular increase in albumin and globulin was noted in all cases. The changes in alpha- and beta-globulins varied from case to case.

J. H. Birkinshaw

RAOULT, A. & PIERCHON, E. Essai d'un traitement du kwashiorkor associant androgènes et cure diététique. [**Trial of Combined Androgen and Dietary Therapy in the Treatment of Kwashiorkor**] *Bull. Méd. de l'Afrique-Occidentale Française*. 1952, v. 9, No. 2, 325-40.

The authors point out that in certain circumstances the giving of male sex hormones causes a retention of nitrogen and promotes the formation of muscle and other tissues. Accordingly, for the treatment of kwashiorkor they have used a therapeutic régime, which, in addition to skimmed milk, minced beef and preparations of vitamin A and riboflavin, included a series of intramuscular injections of testosterone propionate, 10 mgm. daily for 10 days. On this régime in 3 months they lost only 1 out of 28 patients, whereas previously mortality had been about 50 per cent. Recovery was usually rapid and satisfactory. [No records are given of any clinical comparisons between the dietary régime alone and with added testosterone propionate. Nor is any laboratory study of the effects of the hormone on nitrogen retention reported. The assessment of the value of the hormone appears to depend solely on clinical impressions.]

R. Passmore

WADSWORTH, G. R. & OLIVEIRO, C. J. **Plasma Protein Concentration of Normal Adults living in Singapore.** *Brit. Med. J.* 1953, Nov. 21, 1138-9. [13 refs.]

"The plasma protein concentration of 80 men and 59 women was measured by the copper sulphate specific gravity method, and found to be 7.8 g. and 7.6 g. per 100 ml. respectively.

"The accuracy of the method was tested against estimations of total nitrogen made by the macro-Kjeldahl method. Close agreement was found between the two series of estimations.

"The difference between the mean plasma protein concentration of Asians and that of Europeans was not statistically significant.

"The findings suggest that living in a warm climate might be associated with a relatively high plasma protein concentration which is not a result of dehydration or of increased antibody formation."

[See this *Bulletin*, 1951, v. 48, 827; 1952, v. 49, 535.]

HAEMATOLOGY

DAS GUPTA, C. R., CHATTERJEA, J. B. & BASU, P. **Vitamin B₁₂ in Nutritional Macrocytic Anaemia.** *Brit. Med. J.* 1953, Sept. 19, 645-9. [13 refs.]

Whereas it is generally agreed that folic acid specifically cures patients suffering from nutritional macrocytic anaemia, no such general acceptance has been accorded to vitamin B₁₂ as a specific therapeutic agent in this disease. The present investigation was undertaken to find out more about

the value of the vitamin in this particular anaemia. Twenty-two Indian patients suffering from nutritional macrocytic anaemia with a cellular megaloblastic bone-marrow were investigated. As a high-protein diet has distinct haemopoietic activity in nutritional macrocytic anaemia all were given an identical diet in which the only animal protein was derived from 16 oz. of milk and 4 oz. of fish per day. Good improvement was noted initially in 14 out of 22 patients, but the improvement was sustained and led to complete cure in only 5 cases. Folic acid was given after vitamin B12 in 14 cases, with good response in 8 of them, but complete cure was achieved in 4 only. Still later, crude liver extract was given to 8 patients who had not responded to either compound and all except one showed further response. As regards vitamin B12 the authors reach the conclusion that nutritional macrocytic anaemia is caused by a deficiency of both folic acid and vitamin B12, but that vitamin B12 is only a minor and secondary factor in most cases.

H. Lehmann

DE VRIES, S. I. & VAN VALKENBURG, R. A. Thalassaemie (anaemie van Cooley) bij een Nederlandse familie. [**Thalassaemia (Cooley's Anaemia) in a Dutch Family**] *Nederl. Tijdschr. v. Geneesk.* 1953, Oct. 24, v. 97 (iv), No. 43, 2789-98, 3 figs. (2 on pl). [33 refs.]

The English summary appended to the paper is as follows:—

“Report on a Dutch family—the first to be described in the Netherlands—with thalassaemia minor and thalassaemia minima. The characteristic anomalies were demonstrable in nine relatives.”

EDINGTON, G. M. **Sickle-Cell Anaemia in the Accra District of the Gold Coast. A Review of Twenty Cases.** *Brit. Med. J.* 1953, Oct. 31, 957-61, 1 fig. [48 refs.]

Whereas it is agreed that sickle-cell anaemia is relatively common in America, the majority of authors in Africa regard the disease as rare, yet the incidence of the sickling trait in the African may be more than twice that seen in the American Negro. Recently publications have appeared which seem to show that sickle-cell anaemia may be more frequent in Africa than has hitherto been assumed. To find this higher incidence it seems necessary to search for it among children and adolescents. The author has seen 33 patients with sickle-cell anaemia in the Gold Coast, 20 of whom could be examined in detail. Some of the cases had been referred to the author by medical colleagues as suspected cases for examination, others were discovered by following up patients in the Gold Coast hospital in whom a sickling test had been requested and had been found to be positive, or by examining patients in the same hospital where many target cells had been seen in the peripheral blood smear on which routine differential blood counts had been performed. The criteria of sickle-cell anaemia were: sickling of erythrocytes, increased haemolysis with persistently raised reticulocyte count, lack of response of the haemolytic anaemia to malarial therapy, low erythrocyte sedimentation rate, lack of response of the joint pains to salicylate therapy and the absence of any other condition which might be responsible for the haemolytic anaemia.

It will be seen that these criteria excluded the 3 important differential diagnoses of malaria, rheumatic fever and thalassaemia.

Seven of the 20 patients had no complaints at the time of examination. The symptoms in order of frequency were: joint pains (11), fever (9),

nausea (9), headache (5), abdominal pain (4), pains in the limbs (4), pain in the chest and lumbar pain (2), weakness (2), yellow eyes (2), eye complaints (2), dizziness (1), leg ulcer (1), and palpitation (1). The 2 patients with eye complaints had aneurysms of their retinal vessels, otherwise the symptoms and the physical conditions responsible for them were those usually described in the literature. "Tower skull" was noted in 2 patients and mongoloid features were found in 2 others. Jaundice was seen in 9. Scars of old ulcers were found in 7. One patient had active leg ulcers. Two patients had joint swellings.

The types of anaemia in the 20 cases were normocytic orthochromic in 7, normocytic hypochromic in 4, macrocytic orthochromic in 1, macrocytic hypochromic in 4, microcytic orthochromic in 3, microcytic hypochromic in 1. The haemoglobin varied from 4 to 14.2 gm. per 100 ml. blood.

The rapidity and degree of sickling varied from patient to patient and the replacement of the flexible biconcave red cell shape by oat- or sickle-shaped cells could not but influence the red cell volume from which the absolute values, used in the classification of anaemias, were calculated. Hence the great variety in the types of anaemia. [Perhaps the wide range of possible complicating afflictions described by the author—ankylostomiasis, ascariasis, malaria, malnutrition, etc.—may also have played a part in producing such a multiple picture.] The erythrocytes were in all instances more resistant to hypotonic salt solutions than normal controls. In 10 patients only were sickled cells seen in the untreated blood smear.

The bone-marrow was examined in 9 patients and always showed a normoblastic hyperplasia. Of 17 X-rayed patients 9 showed radiological changes considered to be caused by sickle-cell anaemia. There was hyperplasia of the bone-marrow and bone lesions could be seen which had been produced by blockage of blood vessels by sickled erythrocytes with consequent infarctions. An illustration is produced showing such an infarctive lesion in a femur.

The previous histories in all cases were strikingly similar. There were severe recurrent attacks of pain in the larger joints of the limbs starting usually in infancy, but in one patient as late as at $7\frac{1}{2}$ years of age. There was a tendency for the disease to improve with advancing years and in one patient aged 44 years no attacks had been experienced for 9 years. This gradual improvement with age resembles that seen with malaria, and as with malaria crises tended to occur in the cold weather. The author suggests that malaria might be the trigger mechanism in initiating sickle-cell anaemia crises.

Whenever it was possible to examine both parents, both showed the sickling phenomenon; results of family studies agreed with the homozygous theory of sickle-cell anaemia. With an overall incidence of 19 per cent. of the sickle-cell trait the expected incidence of the anaemia would then be 1 per cent. Only one case of sickle-cell anaemia was, however, discovered in a survey of 2,255 Gold Coast Africans (0.05 per cent.). This figure is considered fallacious, however, as the survey included multiparous women, mothers at term and new-born infants. Neonates are generally considered to be protected against sickle-cell anaemia and women with the anaemia rarely survive the early stages of their first pregnancy. It was perhaps significant that the one sickle-cell anaemia patient discovered in the survey was among 200 schoolchildren aged 8 to 12 years (0.5 per cent.).

[One of the many important contributions to be found in this paper is the description of improvement of the condition with age. If the disease were more frequent in children than in adults solely because all the patients died early in life, incidences of sickling of over 40 per cent. such as seen in some

East African tribes—which must include homozygotes—would make the homozygous sickle-cell anaemia theory unacceptable. This work may be the last step in clarifying the difficulties experienced in accepting for East Africa the homozygous sickle-cell anaemia theory.] *H. Lehmann*

GOLDIN, A. G., KELTY, K. C. & BEARD, M. F. **Sickle Cell Anaemia terminating in Acute Myeloblastic Leukemia.** *Ann. Intern. Med.* 1953, Oct., v. 39, No. 4, 920-28, 4 figs. [11 refs.]

“1. A case of sickle cell anemia terminating in acute myeloblastic leukemia is presented.

“2. The differentiation of leukemia from leukemoid reaction is discussed.”

ROCHE, J., DERRIEN, Y. & LAURENT, Georgette. Sur les fractions alcalinorésistantes des hémoglobines dans les anémies drépanocytaires. [**Alkali-Resistant Fractions in Haemoglobins in Sickle-Cell Anaemia**] *C.R. Soc. Biol.* 1953, June, v. 147, Nos. 11/12, 957-60, 1 fig.

GERRITSEN, T. & WALKER, A. R. P. **Serum Iron and Iron-Binding Capacity in the Bantu.** *South African Med. J.* 1953, July 11, v. 27, No. 28, 577-81. [23 refs.]

The levels of serum iron, total iron-binding capacity and haemoglobin were determined in groups of young adult Bantu mine-labourers from different regions of Southern Africa. In some groups, *e.g.*, the subjects from Nyasaland, the serum iron values were higher than any previously reported even including the high values frequently found in haemochromatosis and transfusional siderosis. In certain groups, elevated values have unexpectedly been found for total iron-binding capacity. This observation combined with unsaturation of iron-binding capacity of the serum protein constitutes a salient difference from the findings in the diseases mentioned.

J. H. Birkinshaw

See also p. 208, VAN OYE, La courbe de Price-Jones dans la malnutrition et dans la dénutrition (= kwashiorkor) en Afrique. [**The Price-Jones Curve in Malnutrition and Kwashiorkor in Africa.**]

See also p. 207, BRONTE-STEWART, **The Anaemia of Adult Scurvy.**

VENOMS AND ANTIVENENES

HOGUE, A. R. Notas erpetológicas. 1. a Contribuição ao conhecimento dos ofídios do Brasil Central. [**Notes on Herpetology. 1. Contribution to the Knowledge of the Ophidia of Central Brazil**] *Mem. Inst. Butantan.* 1952, v. 24, No. 2, 179-214, 12 figs. & 1 map. [Numerous refs.] English summary.

HOGUE, A. R. Notas erpetológicas. 2. a Contribuição ao conhecimento dos ofídios do Brasil Central. [**Notes on Herpetology. 2. Contribution to the Knowledge of the Ophidia of Central Brazil**] *Mem. Inst. Butantan.* 1952, v. 24, No. 2, 215-24. [25 refs.] English summary (4 lines).

HOGUE, A. R. **Snakes from the Uaupés Region.** *Mem. Inst. Butantan.* 1952, v. 24, No. 2, 225-9, 1 folding map.

PIANTANIDA, M. & MUIĆ, N. **Paper-Strip Chromatography of the Proteinic Components of Ammodytes Viper Venom.** *Arch. Biochemistry.* 1953, Sept., v. 46, No. 1, 110-18, 3 figs.

AMORIM, M. DE F. & DE MELLO, R. F. Nefrose do nefron intermediário no envenenamento crotálico humano. Estudo anátomo-patológico. [**Nephrosis of the Intermediate Nephron in the Human Crotalic Poisoning. Anatomo-Pathological Study**] *Mem. Inst. Butantan.* 1952, v. 24, No. 2, 281-316, 24 figs. (5 coloured). [39 refs.] English summary.

In poisoning by *Crotalus terrificus terrificus* and *Bothrops jararaca*, apart from the local lesions, haemorrhage and necrosis of the skin, subcutaneous tissues and underlying muscles, and the multiple visceral haemorrhages, the chief lesions seem to fall on the kidneys, producing the signs now familiar as "crush syndrome", but these are secondary to the principal degenerative lesions.

The authors record in minute detail the morbid anatomy and histopathology of 3 fatal cases of bites by *Crotalus t. terrificus*. The first was in a man of 58 years, bitten on the left foot, who lived for 5 days, 4 hours; the second a man of 30 years dying in just over 3 days after being bitten on the right foot; the third a boy of 12 years [site of the injury is not mentioned] who was given antivenene 6½ hours after being bitten and lived for 6 days, 14 hours.

In the autopsy reports the macroscopical and microscopical changes are described organ by organ and tissue by tissue in great detail, but, as the title indicates, the kidney lesions are the main object of this communication. These may be summarized as degeneration and necrosis, especially of the ascending limb of the loops of Henle and the convoluted tubules, with haemoglobin casts; the same was present in the collecting tubules. In two of the patients there was inflammatory reaction with oedema and histocyte hyperplasia. These were not found in the medullary zone. There was an associated myohaemoglobinuria or haemolytic anaemia as described by BYWATERS and DIBLE [*Bull. War Medicine*, 1942, v. 3, 57] and others at the end of the last war as occurring in the crush syndrome and in the toxæmia of pregnancy and as known to readers of this *Bulletin* to be found in subtertian malaria, and in transfusion with incompatible blood, as well as in snake poisoning. The authors discuss what name should be given to this condition and conclude in these words:

"Considering that the parts most affected by these lesions are just those which have been termed the intermediate segments of the nephron . . . and that the more intense lesions are principally localized, not in the medullary zone, but really in the limiting zone and the renal cortex, the authors prefer for this type of pattern the denomination 'Intermediate Nephron Nephrosis' or 'Necrotizing Intermediate Nephron Nephrosis'. They suggest the necessity of reserving, in renal pathology, the term 'nephrosis of the distal or lower part' of the urinary tubule for those cases where degenerative and necrotic lesions are really predominating in the medullary zone of the kidney, such as the renal lesions produced by uric gout and many other morbid conditions. . . ."

H. Harold Scott

DE MAGALHÃES, O. Escorpionismo. [**Scorpion Stings**] *Brasil-Médico.* 1953, Apr. 18 & 25, v. 67, Nos. 16/17, 307-11, 4 figs.

After some general remarks on the scorpions of Belo Horizonte, notably *Tityus serrulatus* and *T. bahiensis*, the author records the case of a youth

18 years of age, healthy and well-built, living in Capitão Eduardo, about 15 kilometres from Belo Horizonte, stung between the thumb and forefinger of the left hand when removing some wood left on the ground. The scorpion was a female *T. serrulatus*. When admitted to hospital, 2-2½ hours later, he complained of headache and general weakness and he had a slow pulse. Oedema of the lungs supervened in spite of treatment by antivenene, cardiazol and ephedrine, and death occurred the next day, 25 hours and 40 minutes after infliction of the injury. The patient stated that he had been stung several times before by scorpions, but without serious consequences. Photographs of the scorpion and of the terrain where they occur are reproduced.

H. Harold Scott

ALLEN, G. W. **Black Widow Spider** (*Latrodectus mactans*) **Poisoning treated with d-Tubocurarine Chloride.** *Ann. Intern. Med.* 1953, Sept., v. 39, No. 3, 624-5.

The venom of *Latrodectus mactans* is said to be a toxalbumin, with its most damaging action on the nerve endings. The characteristic systemic manifestations which follow a bite of this spider are chiefly pain and muscle spasm, particularly in the abdomen and back [see this *Bulletin*, 1936, v. 33, 401].

The author describes the case of a man weighing 135 lb. who was seen 6 hours after having been bitten on the scrotum by a *Latrodectus mactans*. He suffered from bilateral lumbar spasm, which rapidly increased so that within 2 hours, despite the usual recommended treatment, the back was held in an opisthotonoid position, the abdominal muscles were rigid and almost board-like, and there was slight interference with respiration because of the tightness of the intercostals.

On the principle that curare can block nervous impulses at the myoneural junction and relax spasm, it was decided to use it: the patient was given slowly 60 units (9.0 mgm.) of d-tubocurarine intravenously. Relaxation and relief of pain were striking and almost immediate: 1½ hours later an ampoule of specific antivenene was given to antagonize any non-fixed toxin that might still be circulating. Four hours later, symptoms began to return; an additional 60 units of d-tubocurarine in 1,000 cc. of saline were given intravenously during the next 3 hours and the symptoms promptly subsided. The patient was discharged next day with no complaints.

The author points out that the short duration and nature of this condition make it ideal for treatment with curare. Only small doses may be necessary, and a very satisfactory method of adjusting the dose to the symptoms and reaction is to dilute it into an infusion. The usual precautions should be observed.

This is believed by the author to be the first use of curare in the treatment of *Latrodectus* poisoning and it seems to have been immediately successful, where the usual treatment (calcium gluconate and morphine) had failed [see also this *Bulletin*, 1953, v. 50, 337, where epinephrine appeared to produce a similarly dramatic recovery].

H. J. O'D. Burke-Gaffney

TANGE, Y. Beitrag zur Kenntnis der Morphologie des Giftapparates bei den japanischen Fischen, nebst Bemerkungen über dessen Giftigkeit. I. Über das Vorkommen des Giftapparates bei den japanischen Knochenfischen. [Observations on the Morphology of the Poison Apparatus of Japanese Fish and on their Toxicity. I. The Poison Apparatus of Japanese Teleosts] *Yokohama Med. Bull.* 1953, Apr., v. 4, No. 2, 120-28, 2 figs. [14 refs.]

TOXOPLASMOSIS

PIGEAUD, M., GARIN, J. P. & LAMBERT, R. Toxoplasmosse humaine, enquête épidémiologique dans une maternité lyonnaise, utilisation du test intradermique à la toxoplasmine. [**Survey of Human Toxoplasmosis in a Maternity Hospital of Lyons by means of the Intradermal Test**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 4, 498-500.

The authors report the results of the examination of 150 pregnant women in the obstetrical clinic of Lyons by means of Frenkel's intradermal test with toxoplasmin. The latter was prepared by freezing the peritoneal exudate of mice infected with *Toxoplasma*. For the test, 0.1 cc. of 1/1,000 dilution of toxoplasmin was injected intradermally, the appearance of an erythema exceeding 10 mm. in diameter after 48 hours being regarded as a positive reaction.

Of the 150 women tested, 16 (10.6 per cent.) showed a positive reaction, 85 were negative and 49 doubtful. The proportion of positive reactions varied in different groups as follows: among 31 women under 22 years of age only 2 (6.4 per cent.) were positive, whereas among 119 older women 14 (11.8 per cent.) were positive; among 93 town-dwellers 12 (12.9 per cent.) were positive, while among 54 country-dwellers 4 (7.4 per cent.) were positive. As regards the mothers whose offspring were not normal, the results of the test were as follows: among the mothers of 8 still-born infants it was positive in 2 cases (25 per cent.), but since in 3 cases the cause of death was known, the percentage of positive reactions for the remaining 5 cases of still-birth is actually 40; among the mothers of 7 prematurely born infants, one reacted positively (14 per cent.); furthermore in 12 cases, in which "the ratio between the weight of the infant and the weight of the placenta" exceeded $1/4$, the reaction was positive in 2 mothers (16.6 per cent.); finally, in 26 cases the weight of the new-born infant was below 3 kgm., but the reaction was positive only in 3 mothers (11.5 per cent.).

It is concluded that, although the intradermal test can be used for the diagnosis of toxoplasmosis, its value is qualitative rather than quantitative, and it is applicable chiefly in chronic cases, for in acute cases the reaction is negative. Moreover, the intensity of the reaction does not correspond to the gravity of the infection.

C. A. Hoare

GIROUD, P., LE GAC, P., GAILLARD, J. A. & ROGER, F. La toxoplasmosse, maladie de l'adulte, existe soit comme une affection fébrile, soit comme une affection exanthématique de type boutonneux. L'inoculation des toxoplasmes le prouve. [**Toxoplasmosis in the Adult with Febrile and Exanthematic Manifestations: Demonstration by Animal Inoculation**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 3, 318-23, 1 fig. on pl.

The authors record observations on toxoplasmosis detected in adult Africans and Europeans in French Equatorial Africa. In view of the prevalence in the country of different types of typhus fever, and of corresponding symptoms in some of the patients, serological tests with rickettsial antigens were carried out in all cases. In the Middle Congo, among 10 persons with symptoms of typhus fever, the specific tests were negative in 1 case, but inoculation of the patient's blood into a guineapig produced in the latter a toxoplasmic infection. The sera of 2 of 8 other patients reacted positively to the dye test for toxoplasmosis. In Oubangui-Chari toxoplasms were isolated from 3 Africans and 1 European. Two of the patients had

been suffering from high fever (upwards of 40°C.) for about a fortnight; one had symptoms of exanthematic fever, and another died after an illness of 3 days. In all these cases the toxoplasms were isolated by inoculation of guineapigs or mice with the blood of the patients, and the serological tests for toxoplasmosis were positive.

On one occasion toxoplasmosis was also detected serologically in 2 dogs belonging to one of the patient's household. On another occasion, the infection in a macaque monkey inoculated with toxoplasms isolated from a patient produced a maculo-papular skin eruption and symptoms of pleurisy.

All the patients reacted negatively to serological tests for typhus fever. It is emphasized that the rodents used for experimental infections were imported from France, where they are free of infection. C. A. Hoare

WESTPHAL, A. & PALM, Gerda. Latente Toxoplasmainfektionen im Tier-versuch als diagnostisches Hilfsmittel. I. Technik und Anwendung der Methode bei epidemiologischen Untersuchungen. [**Latent Toxoplasma Infections in Laboratory Animals as Supplementary Diagnostic Method. I. Technique and Application of the Method in Epidemiological Investigations**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, June, v. 4, No. 3, 322-39, 15 figs. [17 refs.]

Inoculation of laboratory animals occupies an important place in the parasitological diagnosis of human toxoplasmosis and in experimental studies of this disease. Though the infection in mice usually runs an acute course, it is sometimes latent and undetectable, and since latent infections have also been observed to occur spontaneously in tame and wild mice, care should be taken to use for diagnostic purposes only specially bred stock, free of toxoplasmosis, or the infection should be excluded by negative serological reactions. The authors have found that golden hamsters (*Cricetus auratus*)—because of their larger size—are more suitable for serological testing; moreover their response to the infection is similar to that of mice. On account of this and because of a special histological reaction, described below, hamsters are now used almost exclusively by the authors. They have now developed 2 indirect diagnostic methods for toxoplasmosis, for which hamsters are used, irrespective of whether the infection in them runs an acute or latent course.

The first method is serological, in which the dye and complement-fixation tests are employed. After 6 weeks' quarantine, the hamsters undergo preliminary serological tests. If these are negative, they are inoculated intraperitoneally or fed with the material for diagnosis. The inoculation is followed, 4-6 weeks later, by the diagnostic serological tests. Both for the preliminary and final tests, about 1 cc. of blood can be withdrawn repeatedly from the cut tip of the tail into a small tube by means of a pump, which is attached to a glass cylinder, the opposite end of which surrounds the root of the tail. If more blood is required, it is obtained by heart puncture.

The second method, known as the "hamster liver test", is based on a specific histopathological reaction observed in the liver of hamsters with a latent *Toxoplasma* infection. In impression dabs of the liver stained by Giemsa's method it is seen that the parenchyma cells contain recognizable blue-black inclusion bodies. That these do not represent pigment is evident from the fact that in fresh preparations they are seen as colourless granules. Since they are also clearly visible by phase microscopy, these bodies are not formed by the deposit of Giemsa stain. These inclusions are not found in the liver of normal hamsters, or any other laboratory animal, nor in those

infected with trypanosomes or leishmaniae. They are also absent in acute infections of the hamster. It is thought that this reaction is produced by some form of toxoplasmic intoxication. There is a close correspondence between the serological and liver reactions in infected hamsters, but the latter persists for a longer time.

The diagnosis of toxoplasmosis in experimentally infected hamsters with the "liver test" is done by liver biopsy, the technique of which is fully described. The material thus obtained is dabbed on a slide and stained by Giemsa's method, after which it is examined microscopically.

These indirect diagnostic methods have been used by the authors to check the results of experiments and observations on the transmission of toxoplasmosis, carried out as follows: with rat-fleas, with faeces and urine of rodents, with material from intestinal ulcers of foxes, with the milk of rats and dogs, and with the foetuses of mice and women. For details of these experiments the original should be consulted.

The paper is illustrated by figures showing the methods of diagnosis, the liver inclusions, and various experimental methods.

C. A. Hoare

BRINGMANN, G. & HOLZ, J. *Toxoplasma gondii* im elektronenmikroskopischen Bild. [*Toxoplasma gondii* as seen by Electron Microscopy] *Ztschr. f. Hyg. u. Infektionskr.* 1953, v. 137, No. 2, 186-91, 14 figs.

After summarizing what is known regarding the morphology of *Toxoplasma gondii*, as seen under the light microscope, the authors describe the structure revealed by electron microscopy.

The material used for the preparations was obtained by suspending the peritoneal exudate of an infected mouse in distilled water, and centrifuging the mixture 4 times at 3,000 r.p.m. in order to remove the ascitic slime.

When viewed with the electron microscope the parasite is non-transparent: this is attributed to the accumulation of ribonucleic acid in the cytoplasm. In interpreting the structures seen, a comparison is made with the appearance of the parasite by light microscopy. Thus, certain indefinite dark inclusions are thought to correspond to the metachromatic granules, representing phosphates. It was found impossible to bring about a differentiation of nucleus from cytoplasm by hydrolysis of the ribonucleic acid with HCl, but this could be effected by extracting the organisms in double-distilled water at 60°C. This method also reveals the phosphate granules in the cytoplasm, as well as stages of nuclear division. There was no evidence of the presence of a flagellum in *Toxoplasma*.

[It is obvious from this paper that electron microscopy is inferior to light microscopy for the study of the morphology and cytology of *Toxoplasma*. Moreover, judging from the photomicrographs purporting to illustrate the structures seen in *Toxoplasma* with the electron microscope, it would seem that the interpretation of their nature requires considerable imagination on the part of the observer.]

C. A. Hoare

SCHMIDT-HOENSDORF, F. & HOLZ, J. Zur Biologie und Morphologie des *Toxoplasma gondii*. [*Biology and Morphology of Toxoplasma gondii*] *Ztschr. f. Hyg. u. Infektionskr.* 1953, v. 136, No. 6, 601-4, 3 figs.

The authors describe observations on some controversial points in the morphology and biology of *Toxoplasma*. One of these is the existence of a flagellum described by some observers. The authors have never been able

to detect a flagellum in the parasites, either by using special staining methods or by electron microscopy. On the other hand, they have satisfied themselves that these parasites are endowed with independent locomotion, a property denied by most other observers. Their motility can be observed in cultures at 37.5°–39.5°C. by direct observation, and demonstrated by microcinematography. The authors have also followed all stages of active penetration of the host-cell (macrophage) by these parasites, as well as their multiplication by binary fission, and the subsequent escape of the daughter-individuals.

Locomotion of the toxoplasms is illustrated in a series of cinematographic films seen at intervals of 1/18 of a second.

Details of the culture medium and methods of observation are given in another paper (see below).
C. A. Hoare

HOLZ, J. & ALBRECHT, Marianne. Die Züchtung von *Toxoplasma gondii* in Zellkulturen. [**Propagation of *Toxoplasma gondii* in Cell Cultures**] *Ztschr. f. Hyg. u. Infektionskr.* 1953, v. 136, No. 6, 605–9, 2 figs. [11 refs.]

The authors have devised special culture methods for observation of the activities of *Toxoplasma*. The simplest method consists of placing the parasites from the peritoneal exudate of an infected mouse in a drop of serum on a coverslip, which is then covered with a polished slide and sealed with paraffin wax.

By direct observation under a microscope in a warm chamber it could be seen that at 37.5°–39.5°C. the parasites are motile, and actively penetrate into macrophages. The macrophages, which at first exhibit movement, come to a rest in contact with the parasite, which then proceeds to bore itself into the host-cell.

For the cultivation of infected tissues (especially bone-marrow of guinea-pig), a drop of medium, consisting of equal parts of fowl plasma and embryo extract + serum of the animal whose tissue is used for cultivation, is placed on a 2.4 × 5 cm. coverslip, and inoculated with a piece (2 mm.) of tissue, after which the preparation is covered with a slide and sealed with paraffin wax. In these cultures active penetration of the proliferating tissue cells by the parasite took place within 4 days, after which the host-cells disintegrated, releasing the parasites.

The behaviour of the parasites in these hanging drop cultures could also be observed and recorded by microcinematography as shown in the figures illustrating this paper.
C. A. Hoare

HELLBRÜGGE, T. F., DAHME, E. & HELLBRÜGGE, F. K. Tierexperimentelle Beobachtungen zur diaplazentaren Infektion der Toxoplasmen. [**Animal Experiments on Transplacental Transmission of Toxoplasms**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1953, June, v. 4, No. 3, 312–22. [19 refs.]

After a review of the existing data on congenital toxoplasmosis, the authors describe their own experiments on transplacental transmission of *Toxoplasma*. Pregnant females rats were inoculated intravenously with massive doses (1 cc. suspension containing 10 million parasites) of toxoplasms, after which they were sacrificed at various intervals of time, and the placenta and foetuses (entire, or liver and heart separately) were

examined for the presence of parasites, directly and by subinoculation of mice. By the latter method—which proved to be the only reliable one—it was demonstrated that toxoplasms were present in the placenta 1 hour after inoculation of the rats, but they appeared in the fetuses only after 48 hours, and persisted even in the offspring of rats inoculated 5 months previously, when the maternal infection was latent. It was thus shown that congenital infection in rats can take place during the acute, chronic and latent phases of the maternal infection.

The authors failed to find any histopathological changes either in the infected placenta or in the infected fetuses, from which they conclude that the toxoplasms are transmitted from the maternal to the foetal blood stream, without invading the placental tissues.

C. A. Hoare

GARIN, Jean Paul. Étude du toxoplasme et de la toxoplasmosé humaine acquise. [**Study of *Toxoplasma* and of Acquired Human Toxoplasmosis**] 204 pp., 15 text figs. & 27 figs. on 6 pls. 1953. Lyon: Bosc Frères, 42 quai Gailleton.

Unlike many theses for the doctorate of medicine in French universities, the present dissertation is not merely a critical review or compilation of present knowledge on the subject dealt with, but is based largely on original observations and experiments on human toxoplasmosis carried out in Lyons. The first part of this work is concerned with the structure and biology of the parasite, with the serological methods of diagnosis, and the results of their application in an epidemiological survey. The second part is devoted to the clinical aspects of acquired human toxoplasmosis, whereas the congenital disease—regarding which much more is known—is not dealt with.

In the parasitological section an account is given of the structure, development and bionomics of *Toxoplasma gondii*. The author believes that, in addition to binary fission, this parasite may multiply by schizogony, though he confesses that what appeared to be a multinucleate form was seen by him only once. [However, until convincing evidence of schizogony is provided, most protozoologists will continue to regard such forms—not only in *Toxoplasma* but in *Leishmania* as well—as artefacts produced in dry smears by obliteration of the individual outlines in a group of intracellular parasites. On the strength of this solitary finding the author feels justified in classifying the primitive *Toxoplasma* “à côté de l’hématozoaire du paludisme”, thus disregarding the highly complicated digenetic life-cycle of *Plasmodium*.]

The author then turns to a detailed description and critical appreciation of the serological reactions used for the diagnosis of toxoplasmosis. Of these, the complement-fixation test (Westphal’s modification) proved to be the most reliable, while the dye test was found to be impracticable, owing to the number of variable factors involved. The intradermal test appears to be of no diagnostic value. In a survey carried out by serological methods on inhabitants of Lyons and its vicinity, positive reactions were obtained in 8.5 per cent. of healthy adults (control group), in 35 per cent. of mothers of prematurely or still-born infants, in 24 per cent. of patients in the ophthalmological department, and in 29 per cent. of children in the psychiatry department.

Among the numerous drugs tried out in the treatment of experimental infections in mice, the only promising results were obtained with the parent sulphone (4:4'-diaminodiphenylsulphone).

In the clinical section, the author has collected from the literature the

data on all the known cases (total 70) of acquired human toxoplasmosis, to which he has added 7 of his own. All the cases are grouped according to their symptomatology and are described in detail. The author recognizes the following clinical varieties of the acquired disease: exanthematic form, frequently accompanied by myocarditis and encephalitis; encephalitic or meningitic form, affecting chiefly children; lymphadenitic form, resembling infectious mononucleosis; hepatic or hepato-splenic form; pulmonary form, chiefly occurring as terminal manifestation of generalized infection; synovial or osteo-articular form; and various ocular forms.

The work is illustrated by 6 plates and is accompanied by an extensive bibliography.

[In bringing together all the scattered records of the relatively little known cases of acquired toxoplasmosis, in classifying them in a systematic order and presenting a comprehensive account of their clinical manifestations, the author has performed a valuable service, which will be especially appreciated by clinicians.]

C. A. Hoare

ERICHSEN, S. & HARBOE, A. **Toxoplasmosis in Chickens. I. An Epidemic Outbreak of Toxoplasmosis in a Chicken Flock in South-Eastern Norway.** *Acta Path. et Microb. Scandinavica.* 1953, v. 33, No. 1, 56-71, 8 figs. (6 on 2 pls.). [19 refs.]

"An epidemic of a fatal disease, occasionally causing blindness, in a chicken flock in South-Eastern Norway was found to be caused by toxoplasma-infection. The parasites were demonstrated by histological examination in 5 chickens, in 3 of these cases the infection was transmitted to mice. In early passages the virulence of the chicken strain to mice appeared to be low. Cortisone treatment increased the susceptibility of the mice, and in subsequent passages the strain was fully virulent. Serologically the toxoplasms isolated from chickens behaved like the 'R.H.'-strain of *Sabin*. Immunity against the latter strain followed the experimental infection with the chicken strain.

"The most constant lesions caused by the toxoplasms in these chickens were peri- and myocarditis, encephalitis and ulcerating gastro-enteritis.

"Serum from the diseased chickens gave negative or only feebly positive dye tests, and specific antibodies could not be demonstrated by the complement fixation reaction."

CHRISTEN A., R. & THIERMANN I., Erica. Ensayos de quimioterapia de la Toxoplasmosis experimental del ratón. [**Chemotherapeutic Trials in Toxoplasmosis in Mice**] *Bol. Informaciones Parasitarias Chilenas.* 1953, Apr.-June, v. 8, No. 2, 24-6. [17 refs.]

The English summary appended to the paper is as follows:—

"Isonicotinic acid hydrazide, thiosemicarbazone, Nitrofurazone, Primaquine and Terramycin, were ineffective against experimental toxoplasmosis in mice.

"Aureomycin increased the survival time of the treated animals but failed to cure the infection."

DERMATOLOGY AND FUNGUS DISEASES

THOMSON, M. L. & SUTARMAN. **The Identification and Enumeration of Active Sweat Glands in Man from Plastic Impressions of the Skin.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Sept., v. 47, No. 5, 412-17, 7 figs. (6 on 2 pls.).

This method depends on the discharge of sweat from the glands into a solidifying plastic film; sweat is immiscible with the plastic and sweat-gland ostia are marked by bubbles or holes.

The plastic solution consists of:

Polyvinyl formal (formvar), 2-4 gm.

Butyl phthalate, 1 gm.

Colloidal suspension of graphite in ethylene dichloride, 5 ml.

Ethylene dichloride to 100 ml.

The solution is painted on the skin and transparent adhesive tape is pressed on to it when the solvent has dried. The tape and film can then be detached and mounted on a microscopic slide. By this method skin grooves, pilo-sebaceous follicles, and on the palms and soles the ostia of inactive sweat glands can be clearly seen.

Bubbles or holes mark the site of active sweat glands, their size being proportional to the rate of sweating. Successive impressions are readily superimposed by means of the skin grooves and pilo-sebaceous follicles. The method can be used at high rates of sweating, a great advantage over previous methods.

H. T. H. Wilson

SAGHER, F. **Various Tropical Dermatoses.** (A Review of the Literature from Late 1949 to Early 1951.) *Dermatologica.* 1952, v. 105, No. 3, 187-96. [109 refs.]

HASE, A. Hautreaktionen nach Stichen der Gnitze *Culicoides minutissimus* Zett. (Dipt. Heleidae). [**Skin Reactions to the Bites of the Midge, *Culicoides minutissimus***] *Ztschr. f. Parasitenk.* 1953, v. 15, No. 6, 519-37, 1 fig. [17 refs.]

An account is given of the bites of a midge, *Culicoides minutissimus*, on a human volunteer. The insect was allowed to bite the same person 3 times at varying intervals and the skin reactions were carefully noted from the moment of the bite until all symptoms had cleared up. The total duration of time of the skin reactions varied from 9 to 13 days.

Little is known of the specific effect on animals and man of the bites of different species of midges. Casual observations are of little value and some generally acceptable method of recording results is highly desirable. It is suggested that subjective phenomena should be clearly distinguished from objective observations. The methods used in the experiments discussed in this paper consisted, on one hand, of making pastel drawings, with the aim of noting progressive colour changes of the lesions, and, on the other hand, of tracings, on to "Cellophane" paper, of the periphery of the area of skin reaction surrounding the bite. Colour photography would have been very much better but facilities were not available for this method of recording the results at the time when these investigations were carried out (1941). It is felt also that there is scope for a study of the reaction of the skin capillaries at the site of bite.

A description is given of the events following the bites. The earliest noted reaction is a definite haemorrhage from the puncture wound caused by the introduction of the mouthparts of the midge into the skin. This is followed very shortly afterwards (4 to 20 minutes) by severe pain of varying duration (10 to 40 minutes). The subject then feels intermittent itching in this area which may be only slight but may be intense and which lasts for several days. This is followed by swelling and the formation of a definite red papule varying in size, at the site of the bite. At first, the papule is doughy in consistency but soon become hard, the change being accompanied by a shrinking of the lesion. At this stage it becomes erythematous owing to inflammation and there is a definite rise in temperature in the region of the papule. This is followed by the formation of a small or a large vesicle, preceding the complete disappearance of any skin lesion recognizable to the naked eye.

The haemorrhage from the puncture of the skin, the erythema, the swelling, the increase in temperature and the formation of a papule at the site of bite are especially emphasized. The author finally draws attention to the minute size of these arthropods and the violent reaction which follows the bite.

M. M. J. Lavoipierre

STILLIANS, A. W. & KLEMPNER, H. E. **Blastomycosis in Tuberculous Patient.** *J. Amer. Med. Ass.* 1953, Oct. 10, v. 153, No. 6, 560-61, 4 figs.

BARWASSER, N. C. **Chromoblastomycosis. Thirteenth Reported Case in the United States.** *J. Amer. Med. Ass.* 1953, Oct. 10, v. 153, No. 6, 556, 1 fig.

MUKHERJEE, B. B. **North American Blastomycosis.** *J. Indian Med. Ass.* 1953, Oct., v. 23, No. 1, 22-4, 3 figs. on pl.
A case in West Bengal.

FRIEDMAN, Lorraine, PAPPAGIANIS, D., BERMAN, R. J. & SMITH, C. E. **Studies on *Coccidioides immitis*: Morphology and Sporulation Capacity of Forty-Seven Strains.** *J. Lab. & Clin. Med.* 1953, Sept., v. 42, No. 3, 438-44, 7 figs.

Coccidioides immitis, in culture, does not always conform to what is considered to be the typical morphology of the species, macroscopic and microscopic. This fact is of particular importance in laboratories in which the routine work includes the mycological diagnosis of coccidioidomycosis.

To determine the incidence of variation, 47 strains of *C. immitis* were studied. All of the strains when inoculated into mice intraperitoneally caused the death of the animals and were seen in their tissues in the parasitic spherule form, but some of the immature spherules could be mistaken for those of other fungi, such as *Blastomyces*, *Paracoccidioides* or *Cryptococcus*.

Cultures from the infected mice formed the basis of the morphological study in saprophytic life. Two culture media were used: "Sabouraud's" dextrose agar and glucose yeast extract agar (GYE). From their gross morphology, the cultures could be divided into 5 different kinds; the typical form, at first flat, smooth and moist but soon developing a variable amount of cottonous aerial mycelium, from white to tan colour (29 strains). The variations were, a white, knotty, rough, dry type (6 strains), a strongly pigmented, beige to brown type (7 strains), a flat and wet type with or

without projections on the surface (3 strains), and a type with abundant aerial mycelium of a distinctly yellow colour (2 strains).

Microscopically, 21 of the strains showed the typical chains of cylindrical to ovoidal chlamydospores, measuring about 3 by 5 μ , the spores alternating with empty spaces in the mycelium. In some strains, however, these spores were atypical and ranged from large spheres measuring 5.5 to 6.5 μ and occasionally up to 12 μ in diameter, pyriform bodies and pyramidal forms, on the one hand, and slender mycelial fragments of variable size on the other hand.

The influence of the culture medium on morphology was evident; atypical spore forms were produced on both media by 7 strains, typical spores on "Sabouraud's" medium and atypical on GYE by 3 strains, typical only on GYE by 3 strains, spores formed only on GYE by 10 strains, of which 6 formed typical and 4 atypical spores; 3 strains did not form spores on either medium. Probably the humidity or the dryness of the medium also plays an important part in determining spore formation.

Clinical and pathological data from the relevant patients were in no way correlated to variations in the morphology of the fungus. J. T. Duncan

See also p. 198, STAUFFER, Die Bedeutung der Askariden-Infektion für die dermatologische Praxis. [The Importance of *Ascaris* Infection in Dermatological Practice]

HEAT STROKE AND ALLIED CONDITIONS

ELLIS, F. P. **Thermal Comfort in Warm and Humid Atmospheres. Observations on Groups and Individuals in Singapore.** *J. Hygiene.* 1953, Sept., v. 51, No. 3, 386-404, 6 figs. [17 refs.]

European and Asian men and women in Singapore were given comfort vote slips and a sling hygrometer with which they ascertained wet-bulb and dry-bulb temperatures at such times as they recorded their sensations of comfort indoors. They also simultaneously assessed the air movement.

The majority of these sedentary, lightly-clad, acclimatized European men and women were reasonably comfortable when the effective temperature lay between 73° and 78°F.

When the dry-bulb temperature was above 83°F. the comfort of Europeans was greater when air movement was appreciable than when it was inappreciable. Below 77°F. "still" air was more comfortable than slight or moderate air movement. It is thus concluded that increase in air movement may be used to assuage thermal discomfort but only over a limited temperature range. M. L. Thomson

See also p. 221, THOMSON and SUTARMAN, **The Identification and Enumeration of Active Sweat Glands in Man from Plastic Impressions of the Skin.**

MISCELLANEOUS DISEASES

HIGGINSON, J., GERRITSEN, T. & WALKER, A. R. P. **Siderosis in the Bantu of Southern Africa.** *Amer. J. Path.* 1953, July-Aug., v. 29, No. 4, 779-815, 2 text figs. & 13 figs. on 8 pls. [49 refs.]

"In the South African Bantu, siderosis is a common phenomenon. Its morbid anatomical features and the pattern of iron distribution (histologic and chemical) have been described.

"It has been suggested that iron storage occurs principally in the reticulo-endothelial system and liver and not until heavy deposits are present in this system does the element appear in the epithelial tissues. This basic pattern of storage in the liver and reticulo-endothelial system continues to be observed, even in severe cases. By contrast, in classical hemochromatosis, iron storage is believed to be mainly parenchymal.

"The relationship of hepatic fibrosis to siderosis has been examined. It has been confirmed that varying degrees of portal tract fibrosis in the liver are a frequent incidental observation among Bantu patients. No constant correlation was found between the degree of fibrosis and the amount of iron pigment in the liver. Further, cases of severe siderosis were seen without cirrhosis, and conversely, cases of cirrhosis without siderosis. Fibrosis was not observed in other markedly hemosiderotic organs.

"The possible etiology of the condition has been discussed. It is unlikely to be due to metallic poisoning or parasites; it is doubtful whether under-nutrition, malnutrition, or pellagra can be regarded as major etiologic factors. The possibility of oral iron overload occurring among these people would seem to merit further investigation. Finally, the different pattern of iron deposition in idiopathic hemochromatosis and Bantu siderosis argues against these conditions having a common etiology."

AITKEN, W. J. & ROY, K. P. **The Eosinophilic Syndrome. An Epidemiological Study.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1953, Sept., v. 47, No. 5, 418-24.

Among the employees and families on a relatively isolated tea estate in North Bengal, 200 persons were found to have a relative eosinophilia—mostly 20 per cent. or more. Total leucocyte counts were not performed. The total number of persons examined is not stated precisely but was apparently about one-half of the population of the estate—2,000.

Most of the "sufferers" had no symptoms. There was a definite tendency for "the disease" to occur in families or other groups of persons living together. The workers on the estate concerned had a higher degree of infection with intestinal parasites than had those of other estates and those who "suffered from eosinophilia" had a very high degree of intestinal helminthic infection—especially with round-worms [*Ascaris*].

Abdominal pain was complained of by some [a common occurrence in ascariasis] and in 7 cases there was haemoptysis—4 in 1 family. [Results of sputum examination for tubercle bacilli are not recorded.] No mites were found in the sputum.

As treatment for round-worms did not provide complete relief of "the symptoms" the authors reject the hypothesis of causation by intestinal parasites; several persons with high eosinophile counts showed no signs of helminthic infection.

The authors believe that the same conditions which favour the spread of intestinal parasites contribute to the transmission of eosinophilia but that the two conditions are independent.

Newcomers to the garden had a definitely increased eosinophile count within 6-8 weeks of their arrival so the incubation period of the disease is less than 6 weeks. [There is no note of eosinophile counts on arrival from other areas.]

A small outbreak of infective hepatitis had a predilection for those suffering from eosinophilia. The authors conclude that "the syndrome" is an infectious disease possibly caused by a filtrable virus conveyed by faecal contamination in droplets.

[Despite defects and omissions this paper (a record of laborious observation carried out in difficult circumstances) should stimulate further epidemiological studies on the relative and absolute eosinophile counts in apparently healthy inhabitants of areas in the tropics where "eosinophilic lung" is encountered among hospital patients. The use of the word "syndrome" for symptomless relative eosinophilia is hardly justifiable.

In future studies the total number examined, their racial origins and dietetic habits and the effect on the eosinophilia of repeated doses of anthelmintics should be noted as a single dose affects only the worms actually present in the gut and not the transitory tissue phases.]

G. R. McRobert

CICCHINI, T. Sulla poliflegbite tropicale del Castellani. (Contributo clinico.) [Castellani's Tropical Polyphlebitis] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1953, Sept., v. 34, No. 9, 498-505.

The English summary appended to the paper is as follows:—

"The author describes two cases of Castellani's tropical polyphlebitis, giving a clinical contribution to the knowledge of this disease."

DIGGLE, J. H. Favism in London. *Arch. Dis. in Childhood.* 1953, Oct., v. 28, No. 141, 369-71.

"Two cases of favism in Cypriot boys are described. The younger child had a severe attack with haemoglobinuria and required a large blood transfusion. The older child had a milder attack without haemoglobinuria but with jaundice.

"The diagnosis is discussed, and attention is drawn to the importance of eliciting a history of the ingestion of broad beans within two days before the onset of the illness."

PARASITOLOGY: GENERAL

ELSDON-DEW, R. Housing and Parasites. A Comparison of Slums with Sub-Economic Housing. *South African Med. J.* 1953, Oct. 3, v. 27, No. 40, 879-80.

The erection of a municipal "sub-economic" housing scheme (Chester-ville) in the environs of Durban and the pending evacuation of an adjacent slum area (Cato Manor) gave the author an opportunity to compare the two from the point of view of intestinal parasitization of the African inhabitants. Single stool examination, flotation and, where indicated, staining were done

and the surveys were made simultaneously to eliminate any seasonal influences.

The results are shown in 3 tables and it is clear that the incidence and load of parasites were greater in the Cato Manor area and that this was accounted for by the increase of metazoal parasites, the incidence of protozoa showing little change. This the author explains by the fact that protozoa maintain themselves in the bowel, while most metazoa, having an extra-corporeal cycle, can be replaced only by re-infestation. The principal changes are reflected in the incidence of *Ascaris* and *Trichuris* and, to a lesser extent, *Taenia*. The first two being transmitted from infected soil, "one hesitates to think what the soil in Cato Manor must be like". The author speculates on whether the soil of Chesterville will become similarly polluted over the years, with a rise in incidence of helminths, or whether owing to disposal of the eggs in sewers, the incidence will fall still further there.

The principal findings, based on the author's tables, were as follows, in percentages (except where otherwise stated):

						Cato Manor (511 persons)	Chesterville (514 persons)
Parasites	...	...	...	...	...	92.6	82.3
Metazoa	...	...	...	...	...	78.5	56.2
Protozoa	...	...	...	...	...	68.3	67.5
<i>Trichuris</i>	...	...	...	...	...	60.3	39.5
<i>Ascaris</i>	...	...	...	...	...	50.5	26.1
<i>Taenia</i>	...	...	...	...	...	11.0	5.3
<i>E. histolytica</i>	...	...	...	...	...	17.4	15.2
<i>E. coli</i>	...	...	...	...	...	55.0	52.7
<i>E. nana</i>	...	...	...	...	...	27.8	26.7
Persons showing 5 or more parasites	...	...	...	...	...	11.0	2.5
Number of parasites per person	...	...	...	...	...	2.56	1.91
Number of metazoal species per person	...	...	...	...	...	1.33	0.79
Number of protozoal species per person	...	...	...	...	...	1.23	1.12

It is evident that the provision of better housing conditions has had an immediate effect on the metazoal population "though the effect on the protozoal population is likely to be delayed". [This study of the effects of practical social measures on intestinal parasitization is admirable and is to be encouraged elsewhere.]

H. J. O'D. Burke-Gaffney

BECKER, E. R. **How parasites tolerate their Hosts.** *J. Parasitology*. 1953, Oct., v. 39, No. 5, 467-80. [Numerous refs.]

This communication embodies the subject matter of a lecture delivered by the President of the American Society of Parasitologists, at Madison, Wisconsin, on September 8th, 1953, and in part represents the author's own work in this field. It deals largely with seromucoid, a protein-sugar complex. As he points out, parasites are able to survive in their hosts by adaptation of structure, physiology and life cycle. In developing the subject named in the title, fact and speculation have been intermingled. The well-known work of the author and his colleagues on the "sparing phenomenon" is described in which they showed that duck erythrocytes infected with *P. lophurae*, inoculated into young chicks, are protected from the chick's defences by means of inoculated normal or immune duck plasma. Agglutination of duck cells by chicken plasma *in vitro* was likewise prevented by the same reagent even at great dilution. It was shown that

seromucoid, obtained from duck plasma and liver, and whose properties are described at length, was involved in the phenomenon.

Other workers have shown that substances of seromucoid character are inhibitors of proteolytic enzymes and that their polysaccharide components effectively inhibit agglutination or haemolysis of certain red-cell groups, besides acting as a protection for parasites against phagocytosis, and yet at the same time possessing antigenic activity. Mucoproteins obtained from helminths are thought to play the part of anti-enzymes. As mucoids frequently show resistance to enzymatic activity, this property may serve to protect penetrating larvae such as cercariae from their own digestive juices.

Mucoproteins can also function in defence of the host, for example against infection by *Ascaridia galli* in the case of chickens. The author has also linked the activity of mucoproteins with that of opsonins, and they are believed by him to play a part in malaria relapses. This view is based on the fact that seromucoid acts in an analogous manner to an antigen present in malarial protoplasm which competes successfully with antibody and thus spares the parasites, but it is acknowledged that other factors are operative in the relapse. The suggestion is also made that seromucoid plays a part in other diseases as widely different as cancer and tuberculosis.

The general conclusion arrived at is that parasites are able to "tolerate their hosts" by virtue of the seromucoids which they themselves secrete, and that an attack against this defence would repay workers on chemotherapy.

J. D. Fulton

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

LAVOPIERRE, M. M. J. & REYNAUD, P. **A Simple Way of Counting Mosquito Eggs.** *Ann. Trop. Med. & Parasit.* 1953, Oct., v. 47, No. 3, 307-8, 2 figs.

This method has proved to be of real value for work with *Aedes*, *Anopheles* and other mosquitoes which lay their eggs singly and not in rafts.

One end of a strip (6 in. \times $\frac{3}{4}$ -1 in.) of ordinary white writing paper (not glossy or absorbent) is folded at right angles to make a collecting area of $\frac{3}{4}$ -1 in. \times $\frac{3}{4}$ -1 in. This small area is applied for a fraction of a second to the mosquito eggs floating on the water surface and then removed. The eggs adhere to the paper, which is held in one hand while with the aid of a needle used as a pointer in the other hand, the eggs are easily and rapidly counted.

H. S. Leeson

LAVEN, H. **Genetical Aspects offered by the *Culex pipiens* Complex.** Reprinted from *Trans. IXth Internat. Congr. Ent.* Amsterdam. 1953, v. 2, 293-6, 2 figs.

HAYES, R. O. **Determination of a Physiological Saline Solution for *Aedes aegypti* (L.).** *J. Econom. Entom.* 1953, Aug., v. 46, No. 4, 624-7. [14 refs.]

A short review of the concentrations of salts in insect physiological saline solutions used by previous workers is given here, and a modification of one

of these was found satisfactory for the mosquito *Aedes aegypti*. The survival time of spermatozoa obtained from *Aedes aegypti* was used as a criterion in comparing various solutions, and the following concentrations were found to be most satisfactory:

Sodium chloride	...	...	...	...	9.0 gm. per litre
Potassium chloride	...	...	...	...	0.2 " " "
Calcium chloride	...	...	...	...	0.2 " " "
Sodium bicarbonate	...	...	...	...	0.1 " " "

To determine the osmotic pressure of each solution required, drops of blood from *Aedes aegypti* were drawn into a capillary tube alternately with drops of a salt solution of known concentration; air spaces were left between the drops. The lengths of the drops were measured at once and again after being maintained for 24 hours at 37°C. Any increase in length of drops of blood or salt solution indicated a difference in concentration between them, but where no change occurred the solutions were considered isotonic.

A pH value of 6.9, determined colorimetrically, was maintained by buffering with sodium bicarbonate.

Disadvantages in this method are the slight mixing of solutions in the capillary tube, which must occur as the drops are moved along, and also the likelihood of the death of the spermatozoa from mechanical injury or other factors.

Anne Hudson

MATTINGLY, P. F. **New Records and a New Species of the Subgenus *Stegomyia* (Diptera, Culicidae) from the Ethiopian Region.** *Ann. Trop. Med. & Parasit.* 1953, Oct., v. 47, No. 3, 294-8, 1 fig. [15 refs.]

A description is given of a new species of mosquito of the sub-genus *Stegomyia* which is named *Aedes (Stegomyia) usambara*. It closely resembles *Aedes angustus* and is at present known only from a unique female bred from a bored bamboo at Amani, Tanganyika. The male and early stages are unknown.

Since the publication of the author's previous studies on the distribution of the African species of *Stegomyia* [this *Bulletin*, 1953, v. 50, 67] further records have been received and these are noted and discussed.

H. S. Leeson

ROMAÑA, H. F. & HACK, W. H. Contribución al estudio de la lucha anti-mosquito en Resistencia. Ensayos con "Malarial HS". [**Trials of "Malarial HS" in the Control of Mosquitoes in Resistencia, Argentina**] *An. Inst. Med. Regional*. Tucuman, Argentina. 1953, June, v. 3, No. 3, 273-5, 8 figs. on 2 pls. English summary.

"Malarial HS" has been used in Resistencia, Argentina, to control large numbers of culicine mosquitoes which breed in the small lakes and ponds and in the open roadside drains. Malarial HS is a product of the Shell Company, and consists of a 5 per cent. solution of DDT in Malarial, to which have been added substances to increase spreading power; the exact composition is not given. The water in the drains is in some places blocked by vegetation and may at times become stationary; waste water from the houses runs out into the drains with the result that the surface becomes covered with a layer of soap or grease. Applications of "Malarial HS" were made with a hand sprayer and were found to be extremely efficient on a clean water surface, spreading well even where vegetation was present. Where layers of soap or grease had formed, however, the insecticide

accumulated in patches. The quantities of "Malariol HS" used were those recommended by the manufacturer but are not mentioned in the paper.

Anne Hudson

MER, G. G. & FURMASKA, W. **The Effect of the Fat Content in the Fly Food on the Resistance to D.D.T.** *Riv. di Parassit.* Rome. 1953, Jan., v. 14, No. 1, 49-54.

There is evidence from several sources that the resistance of insects to synthetic insecticides is affected, among other things, by the food.

These experiments were carried out with a laboratory strain of *Musca domestica*: the lethal dose of DDT was well known and was stable. The control adults were given water to drink and cane sugar plus whole milk powder as food. The experimental adults were offered foods to which various fats, as emulsions, were added. The results indicate that the addition of fat to the diet renders it necessary to double the exposure to a DDT residue to obtain a 50 per cent. knockdown. This effect, which remains unexplained, is not due to contamination of the surface of the insect by the fat.

P. A. Buxton

RICCIARDI, I., NASCIMENTO, L. P. & DE SOUZA, S. H. Observações sobre um mutante de *Musca domestica* L., aparecido depois de contato com o isômero gama do hexaclorobenzeno, em prova de laboratório. (Nota prévia.) [**Observations on a mutant of *Musca domestica* Appearing After Contact with the gamma Isomer of BHC in Laboratory Tests**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1952, Oct., v. 4, No. 4, 427-31, 2 figs. English summary (4 lines).

The appearance of a mutant form of *Musca domestica* L. has been observed in laboratory experiments in which the gamma isomer of benzene hexachloride was used.

The first colony of flies had been established from house collections made in the district of Cavalcanti, Rio de Janeiro. Five fertilized flies were exposed for 2 minutes on a sheet of cement which had been treated 16 days previously with gamma BHC, 1 gramme per square metre. The flies survived the exposure and eggs were obtained. The F1 generation consisted of 28 normal adults; from these 480 flies were produced whose wings were permanently held open. This stock of flies was lost for independent reasons, but similar experiments with another colony of the same origin were carried out. Thirty flies were exposed for 8 minutes on cement which had been treated with insecticide 48 hours previously. The quantity used in this case was 300 mgm./sq. m. The F2 generation consisted of 1,206 adults of which 14 males and 18 females showed the mutant wing posture. In the following generation all were mutants.

Flies which were allowed to mate after exposure to the insecticide produced normal offspring.

[It is unusual for such a mutation to occur after treatment with insecticide and it is possible that the authors may have omitted to consider the appearance of a recessive character in their stocks.]

Anne Hudson

CAMPOS, R. F. Las moscas (Brachycera) del Ecuador. [**Brachycera of Ecuador**] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1952, Jan.-Dec., v. 8/9, Nos. 1/4, 99-106.

WEIZENBLATT, S. **Ophthalmomyiasis Externa; Larval Conjunctivitis in Socket.** *Arch. Ophthalmology*. 1953; July, v. 50, No. 1, 79-80, 1 fig.

A case, due to *Phormia regina*, in a child in North Carolina.

See also p. 221, HASE, Hautreaktionen nach Stichen der Gnitze *Culicoides minutissimus* Zett. (Dipt. Heleidae.) [**Skin Reactions to the Bites of the Midge, *Culicoides minutissimus*.**]

RODRÍGUEZ M., J. D. Los *Phlebotomus* del Ecuador (Diptera: Psychodidae). II. Revisión de conocimientos. El *P. camposi*. [**Revision of Knowledge of *Phlebotomus* in Ecuador. *P. camposi***] *Rev. Ecuatoriana de Hig. y Med. Trop.* Guayaquil. 1952, Jan.-Dec., v. 8/9, Nos. 1/4, 15-18.

WOLFS, J. & VERCAMMEN-GRANDJEAN, P. H. **Two Trombiculid Larvae (Acarina: Trombididae) from Costermansville (Kivu Province, Belgian Congo) of which one is a New Species: *Schöngastiella wansoni* n. sp.** *Parasitology*. 1953, Nov., v. 43, Nos. 3/4, 207-9, 7 figs.

DAVIS, J. M. & ELLIOTT, K. R. **A Rapid Method for Estimating Aerial Spray Deposits.** *J. Econom. Entom.* 1953, Aug., v. 46, No. 4, 696-8, 2 figs.

In a study conducted at Beltsville, Maryland, a dyed paper has been developed which indicates the degree of atomization and the quantity of a deposit of aerial spray falling on to it, and which is sensitive to almost any oil-base solution.

The paper used is white, with a glossy surface of medium weight and even texture, with a clay-bearing calendar-roll finish; the dye is red and is soluble in oil. A spray droplet produces a circular pinkish spot outlined by a dark red line of dye. "Over a considerable range of drop sizes the ratio of the diameter of the ring to that of the droplet producing it is fairly constant, from 1:6 to 1:7 depending on the characteristic of the spray used."

The paper is easy to prepare in card form, making carriage and distribution simpler. Cards of about 4 x 5 inches to 5 x 8 inches have been used, they were dipped very rapidly into a solution of 1 gramme of du Pont oil red dye in 200 ml. of acetone. After the cards have been exposed to a spray the deposits can be evaluated visually to an accuracy of about 5 per cent. by comparison with known standards. Sets of standard cards have been arranged in book form representing dosages of 0.05, 0.1, 0.2, 0.5, 0.75 and 1.0 gallon per acre, and it was found that in the laboratory about 300 samples per man-hour could be assessed.

Anne Hudson

RAJINDAR PAL, SHARMA, M. I. D. & KRISHNAMURTHY, B. S. **Toxicity of Synthetic and Natural Pyrethrins incorporating Synergists against Mosquitoes.** *Indian J. Malariology*. 1952, Sept., v. 6, No. 3, 331-41, 1 fig. [18 refs.]

Laboratory comparisons were made in a 1,500 cu. ft. room into which kerosene solutions were sprayed with an atomizing gun at the rate of 5 ml. per 1,000 cu. ft. After 30 seconds some 2-day-old laboratory-bred *Culex fatigans* were introduced and exposed to the mist for 20 minutes. After this, both flying and knocked-down mosquitoes were collected and held for

24 hours before mortality counts were made. The chamber was well ventilated before each test and a clean white sheet spread on the floor. The average results of 4 to 8 tests, in different series, are shown in the following table:

<i>Ingredients</i>	<i>Average percentage</i>	
	20-minute knock-down	24-hour kill
0.1% allethrin 0.5% <i>n</i> -propyl isome	78.3	89.7
0.1% pyrethrins	84.5	84.2
0.05% pyrethrins 0.5% piperonyl butoxide	98.6	97.2
0.1% pyrethrins	94.3	88.0
0.03% pyrethrins 0.02% cashewnut shell oil	91.8	85.9
0.05% pyrethrins	77.6	75.3
0.07% pyrethrins 0.03% cashewnut shell oil	97.6	94.5
0.1% pyrethrins	93.0	86.5

These results show the great improvement effected by synergists, especially cashewnut shell oil [see WATS and BHARUCHA, this *Bulletin*, 1939, v. 36, 10].

In tests of residual effectiveness, glass, wood or mud panels were sprayed with pyrethrins or allethrin with or without synergist, and mosquitoes were exposed to them for 15 minutes and held for 24 hours before mortality counts were made. Allethrin at 20 mgm. plus *n*-propyl isome at 200 mgm. per sq. ft. had very little residual action, being scarcely better than 20 mgm./sq. ft. pyrethrins. However, pyrethrins at this rate, plus either 200 mgm./sq. ft. piperonyl butoxide or 10 mgm. cashewnut shell oil, persisted in giving good kills for 3 or 4 weeks.

In a small field trial in villages in the Pulwal district south of Delhi, these 2 treatments and pyrethrins alone at 20 mgm./sq. ft. were tested in 3 villages. The results indicated little or no effect on the mosquito populations, except for the first week after application. J. R. Busvine

BORDAS, E., DOWNS, W. G. & NAVARRO, L. **Inactivation of DDT Deposits on Mud Surfaces.** *Bull. World Health Organisation.* Geneva. 1953, v. 9, No. 1, 39-57, 9 figs. [17 refs.]

In an earlier paper [see this *Bulletin*, 1952, v. 49, 204] the authors have shown that the decomposition of DDT residues on mud walls is associated with catalytic decomposition by iron salts. This paper presents further data showing the close correlation between iron oxide and the decomposition of DDT produced (at high temperature) by soils from various parts of Mexico. The decomposition curves are sigmoid, suggesting an initial

inhibition due to some component of technical DDT; there is no initial lag with pure *o,p'*- or *p,p'*-DDT. The authors have not discovered what this inhibitor is, and of certain other compounds tested for inhibition only tannic acid and "*o,o'*-dihydroxy-DDT" had some value. Of other possible catalysts, aluminium chloride and manganese dioxide had some activity, but much less than ferric chloride. It is considered possible to predict the lasting powers of DDT on mud walls by chemical estimation of iron salts present. A full description of such an analysis is given in an appendix.

Factors affecting the decomposition of DDT were investigated. It was found that samples of technical DDT from different manufacturers varied in their susceptibility to decomposition, though all had about the same *p,p'*-DDT content. The rate of decomposition increased with temperature to a maximum about 120° to 130°C. If the amount of soil (catalyst) was kept constant, not more than a certain quantity of DDT could be degraded; but with excess of DDT, the amount attacked increased in linear fashion with amount of soil added.

An important observation was that the catalysis is inhibited by moisture. All the laboratory investigations of rate of decomposition, etc., must be done with perfectly dry samples.

The presence of moisture also appears to reduce adsorption of DDT into mud as described by HADAWAY and BARLOW [this *Bulletin*, 1953, v. 50, 165]. This is shown by the rapid loss in insecticidal action of DDT on dry mud which nevertheless contains 60 to 90 per cent. of the original deposit. This decline in activity can be retarded by a continual damp atmosphere and the activity can be partially restored in such blocks by exposure in a saturated atmosphere. Something of this type seems to happen in the field in areas where a damp rainy season increases the effectiveness of DDT residues. Data to support this are provided from a house in Mexico. Nevertheless, it did not seem to be feasible to inhibit absorption of DDT into mud by pre-spraying with hygroscopic materials. Indeed, the most promising method of prolonging the life of DDT residues was to limewash the walls before spraying, as suggested in the earlier paper.

J. R. Busvine

RAJINDAR PAL & SHARMA, M. I. D. **Rapid Loss of Biological Effectiveness of D.D.T. applied to Mud Surfaces.** *Indian J. Malariology*. 1952, Sept., v. 6, No. 3, 251-63. [22 refs.]

The authors summarize previous work on depreciation of insecticidal films on mud surfaces. The 2 main factors are: (1) rapid physical adsorption of crystals into the mud [HADAWAY and BARLOW, this *Bulletin*, 1953, v. 50, 165]; and (2) slower chemical decomposition, catalysed by various metallic salts [Downs *et al.*, this *Bulletin*, 1952, v. 49, 204]. In this paper the authors give data on the decline of effectiveness of DDT residues on mud panels and on walls of houses in the Delhi area and in other parts of India. Loss of insecticidal power was judged by exposing house-flies or mosquitoes (*C. fatigans*) to the treated surfaces or by counts of the numbers of wild mosquitoes present. Chemical decomposition was judged by the Alessandrini colorimetric test applied to scrapings from the surfaces.

The tests with flies indicated a very rapid decline in effectiveness within the first week or so after application (presumably due to the physical factor of absorption). However, the effect on mosquitoes was much more prolonged, presumably because they are more sensitive than house-flies. A 50 mgm. per sq. ft. deposit remained fairly active for 4 to 6 weeks.

Preliminary tests of the Alessandrini method were not very encouraging, for they gave figures between 30 and 70 per cent. of DDT actually known.

to be present. Thus, it is not surprising that the chemical results were erratic though all showed a gradual decline in the amount of DDT residue. The authors consider that their results show that the rate of decline varies in different areas, so that DDT disappears in 5 weeks in some localities, 11 to 13 in others, but lasts up to 20 weeks elsewhere. *J. R. Busvine*

VISWANATHAN, D. K. **Analysis of Residual Deposits of D.D.T. on Sprayed Surfaces.** *Indian J. Malariology*. 1952, Sept., v. 6, No. 3, 265-73, 1 chart.

As an antimalarial measure in Bombay State, houses are sprayed with DDT, either as a 5 per cent. emulsion or as 2.5 per cent. suspension. These liquids are sprayed at rates to give an estimated deposit of 56 mgm. DDT per sq. ft. Higher doses are obtained by spraying twice or 3 times (to give 112 or 168 mgm. sq. ft.).

The sprayed houses have been regularly visited and samples scraped from the walls for chemical estimations of the residual DDT by a modified Alessandrini colorimetric test. The inaccuracy of this method was to some extent overcome by taking large numbers of samples (an average of 9 for the suspension series and between 18 and 117 for each figure of the emulsion series).

The results are plotted graphically and all show a decline in DDT residues roughly proportional to the amount present. Thus the rate of depreciation is very rapid in the first few weeks but gradually becomes slower. It appears that the data fit reasonably well to curves of the formula:

$$y = a + bx - c \log x$$

where y = DDT deposit (mgm. per sq. ft.) and x = time in weeks since application. The following values were obtained:

Initial dosage	Emulsions			Suspensions		
	a	b	c	a	b	c
56	45	$1.07 \pm .45$	50 ± 4.9	40	$1.74 \pm .25$	53 ± 3.1
112	68	$1.68 \pm .11$	73 ± 5.8	64	$2.9 \pm .11$	84 ± 4.6
168	98	$3.14 \pm .07$	116 ± 3.7	99	$4.43 \pm .14$	132 ± 5.8

Neither the coefficient c nor the factor c/a is significantly different as between emulsions and suspensions. The consistent and significantly higher values of b with the suspensions indicate slightly greater values at high doses and somewhat lower figures at low doses, than with emulsions. The differences do not appear to be of practical significance.

The author discusses these results in relation to chemical degradation of DDT. He observes that single large doses sometimes have erratic results compared with smaller rates of application, in regard to effects on mosquitoes and malaria. It is considered that regular small doses are more reliable for malaria control. *J. R. Busvine*

QUARTERMAN, K. D. & SULLIVAN, W. N. **Disinsectization of Aircraft by Lindane Vapors from Filters in the Ventilating System.** *J. Econom. Entom.* 1953, Aug., v. 46, No. 4, 715-16. [10 refs.]

Preliminary tests of *gamma* BHC vapour for aircraft disinsectization were done in U.S. army transport "Constellation" aircraft, both under

pressurized and non-pressurized conditions. Insecticidal action was judged from the effects on 150-200 non-resistant house-flies released inside the passenger cabin and navigator's compartment. The flies were tagged with 1 in. lengths of coloured nylon thread, to aid in recapture; and recoveries after experiments averaged 76 per cent. The insecticide content of the air was determined chemically from time to time.

The *gamma* BHC was vaporized by impregnated glass-wool filters in the ventilating system. Two filters 16 × 25 × 1 inch supplied the main cabin and one 9 × 18 × 1 inch was in the navigator's room. The average air velocity through the filters was about 450 feet per minute.

Preliminary tests gave 5 per cent. mortality of flies after 24 hours and 0.03 µgm. per litre apparent *gamma* BHC [? limit of error of chemical estimation]. After 1 hour's operation of the filters, the average fly mortality was 99 per cent. and the air contained 0.16 µgm. per litre *gamma* BHC. With 30 minutes use of the filters, the fly mortality was 98 per cent. and the air content 0.09 µgm. per litre. After these experiments an hour-long flight with filters removed brought the air content back to the dubious 0.02 µgm. per litre; however, the fly mortality was still 97 per cent. This was due to residual deposits of *gamma* BHC, as shown by tests in which flies were confined against various surfaces inside the plane and gave mortalities ranging from 10 to 100 per cent.

These results were obtained equally under pressurized or non-pressurized conditions.

J. R. Busvine

REPORTS AND SURVEYS

COURRIER DES CHERCHEURS (Office de la Recherche Scientifique Outre-Mer, Paris). 1953, No. 6, 47-104. Recherches médicales: Instituts Pasteur d'Outre-Mer et du Viet-Nam (47-67). Entomologie médicale et vétérinaire (68-104). [**List of Research Workers: Instituts Pasteur Overseas and in Viet-Nam: Medical Research, Medical and Veterinary Entomology.**]

This is the 6th issue of this publication, which contains lists of research workers and their publications during the years 1950 and 1951. It is not merely a collection of lists, however, because in each section (the medical part is divided according to diseases) there is a brief résumé of the papers listed, so that a reader obtains a conspectus of the content of the work done. For instance, under the heading of leprosy, two pages are devoted to an account of the many investigations undertaken, mostly on treatment, and mostly (but not entirely) by the staff of the Pasteur Institute of French Guiana; this account is followed by the list of papers with their full titles and references.

Similarly, in the section on Medical and Veterinary Entomology there are quite lengthy accounts of work done in the various colonies, each divided according to subject. For French West Africa there is a list of *Anopheles*, the principal vectors of malaria are noted, and there is a short essay on the biology of *A. gambiae* in which HOLSTEIN's work [this *Bulletin*, 1953, v. 50, 360] is reviewed. Onchocerciasis is noticed in the same way. French Equatorial Africa, the French Cameroons, and other overseas territories are treated similarly, and altogether these sections provide a readable

account of the work with which these Pasteur Institutes were concerned in the period reviewed.

A feature of value is the list of names of the members of the staffs of the Institutes, which is given at the head of each main section.

Charles Wilcocks

LISBON, PORTUGAL. Cinquenta anos de actividade do Instituto de Medicina Tropical (24 de Abril de 1902-24 de Abril de 1952). [**Fifty Years of Work of the Institute of Tropical Medicine, Lisbon, 1902-1952**] [DE AZEVEDO, J. F., Director]. [In Portuguese and French.] 207 pp., 9 figs. on 9 pls. (5 folding). [Numerous refs.] [1953. Lisbon: Instituto de Medicina Tropical.]

The end of the 19th century saw much activity in Europe in the creation of schools of tropical medicine; the Liverpool and London Schools were founded in 1899, the Hamburg School in 1900, and the Escola de Medicina Tropical de Lisboa in 1902; in the meantime instruction in tropical medicine had been established in France, but without a special school. The interest shown in Portugal was in keeping with the fact that the Portuguese were the first people from the temperate zone to reach the tropical regions, and with the fact that among the earliest writings on tropical diseases (cholera, dysentery and other diseases) were those of Garcia da Horta, who described them under the heading of fevers in accounts of his long stay in the Far East between 1534 and 1570.

The author of this history of the growth of the Lisbon school to its present status shows that at first the course of instruction occupied 4 months and the teaching was in the hands of naval medical officers, in conjunction with the Colonial Hospital. The course was obligatory for medical men of the overseas services and for naval officers. Teaching of bacteriology and parasitology was carried out at the Instituto Bacteriológico Câmara Pestana. From 1904 the classes were held in part of the Colonial Hospital, on the first floor of the Cordoaria Nacional, a building dating from the 18th century and built originally for rope- and sail-making. The School remained here until 1940.

In 1913 the School became attached to the newly-formed Ministério da Instrução Pública, and in 1918 was taken over by the Ministério das Colónias. In 1939 the course was fixed at 6 months, from January to the end of June. The second half of the year was thus available for expeditions overseas, and the accounts given of these numerous expeditions show how well and energetically the staff of the School have carried out this important side of the work. At about this time there were 5 chairs—of hygiene, tropical pathology and medicine, medical zoology (entomology and helminthology), haematology and protozoology, and dermatology with tropical mycology—and in 1951 a chair of bacteriology was added, together with a section on nutrition.

In 1952 the decision was made to construct a new and adequate building to house this Institute. Photographs of the model, and reproductions of the plans, indicate that this will be a dignified and worthy house for the Institute which has already such a distinguished record.

The historical part of the monograph is printed in Portuguese and in French, and this is followed by lists of graduates from 1902 to 1951, and by a detailed schedule of the course on tropical medicine in 1952. A chapter of 34 pages follows, which contains a list of papers published by professors, assistants and investigators of the Institute. The penultimate chapter contains a list of the 658 publications being received in 1952 from most

parts of the world. The final chapter is a list of legislative acts referring to the Institute.

Professor Fraga de Azevedo is to be congratulated on producing this interesting account of the activities of the Institute, and he and his colleagues should be well pleased with their work, which has gained an international reputation for high quality.

Charles Wilcocks

CONGO BELGE. Rapport Annuel de la Direction Générale des Services Médicaux—1952. [**Annual Report of the Medical Directorate General, 1952**] 107 mimeographed pp., 1 folding map. [1953.]

The improving staff position referred to in the Report for 1951 [this *Bulletin*, 1953, v. 50, 172] has been maintained, and continued increase in the recruitment of medical officers has made it possible to strengthen the specialist staff and to fill laboratory and teaching posts. Facilities for study leave are also now possible. Staff on the hygiene side is still below requirements and efforts are being made to rectify this.

In addition to the usual detailed returns, the Report gives interesting data concerning the important diseases of the Belgian Congo, of which the following will be of special interest to readers of this *Bulletin*.

There were 33 cases of *plague*, 22 in the Lake Albert focus and 11 in the Lake Edward, with 19 and 10 deaths respectively. The epidemiological factors are discussed and it is noted that control measures are pursued regularly. Four of the cases of plague were treated successfully with streptomycin together with sulphadiazine.

It is suggested that *yellow fever* endemicity is spreading South and the number of cases and of positive protection tests in the Southern region has increased. This problem is being studied. There were 5 cases during the year, diagnosed by histopathological examination from 1,602 liver biopsies: 2 each were from the Equatorial and Eastern Provinces and one from Kivu.

There were 2,812 cases of *smallpox*, with 72 deaths, compared with 2,524 and 17 in 1951. This is partly accounted for by the introduction by contacts of 292 cases of *variola major* at the end of the year.

Epidemic typhus showed an increase from 70 cases (2 deaths) in Europeans and 135 (6) in Africans in 1951 to 90 (0) and 218 (2) in 1952. *Leptospirosis* which re-appeared in 1951 with 28 cases, increased to 117 cases, with 1 death. There was a decrease in *infectious hepatitis* from 83 cases and 1 death in Europeans and 1,176 and 56 deaths in Africans, to 62 (2) and 508 (46). *Poliomyelitis* increased slightly with 11 cases (2 deaths) in Europeans and 592 (22) in Africans. There were only 4 cases (2 fatal) of *cerebrospinal meningitis* in Europeans, but the number in Africans increased from 148 (60) to 266 (90).

Malaria remains a large problem, but the increase in cases reported from 212,871 to 243,579 is attributed to wider opportunities for discovering it, as medical services extend. Residual insecticides have been effective in reducing incidence in many urban and rural areas, and reductions in parasite rates and of infant deaths from malaria have been gratifying. Success is claimed in clearing at least one area of anophelines by aerial spray. Reference is made to the reduction of parasite rates in a pilot village by the use of Daraprim [pyrimethamine] prophylaxis [this *Bulletin*, 1952, v. 49, 751], though it is added that the rates increased slightly when the drug was discontinued for 25 weeks. In Europeans there were 4,051 cases of malaria, with 11 deaths. There were 35 cases of *blackwater fever*, 3 being fatal.

It is also noted that 48 cases of blackwater fever (8 fatal) occurred in Africans.

The *sleeping sickness* position in general continued to show steady improvement and the endemicity rate showed a further fall from 0.09 per cent. to 0.08 per cent. This is largely attributed to pentamidine prophylaxis during recent years, but it is pointed out that it will be difficult, in practice, to expect much further striking reductions, unless the whole territory could be covered. It seems that the protection afforded by pentamidine is effective for 6 months after injection. Some 6½ million people were subject to survey and 5,242 new cases were found. There were 5 European cases. Detailed notes and statistics are given for each Province.

There were 105 cases of *tuberculosis* in Europeans with 2 deaths. The total number of Africans treated was 13,332. Systematic examination of the people at Léopoldville has shown the importance of control measures there and the necessity is stressed of organizing it on a wide medico-social basis. Mass radiography and treatment are being undertaken in Kivu and a scheme for Katanga has been approved. Of some 40,000 people examined or re-examined in 1952, there were 45 per cent. positive tuberculin tests. There were 20,889 BCG vaccinations.

In general streptomycin with PAS gave good results. In one group of 153 cases, 48 showed bacterial resistance to streptomycin. Good results have been reported in preliminary trials with isoniazid.

There were 2 cases of *yaws* in Europeans and 217,639 in Africans.

Good results were obtained with sulphones in the treatment of *leprosy*. The scheme for leprosy control envisages the establishment in each province of one or two large "*Communauté d'Isolément Organisée*" to accommodate 1,500 persons, and here opportunities for specialized study of the disease will also arise. One such centre is already under construction in Masango in Léopoldville Province, and elsewhere the fusion of a number of smaller leprosaria with such centres is projected. There were 2 cases each of leprosy in Europeans in Kivu and Katanga respectively. There were 156,639 Africans under treatment.

The usual large number of *helminthic* diseases is reported. It is noted that there were 10 cases of urinary and 54 of intestinal schistosomiasis in Europeans: the figures for Africans were 2,626 and 16,865, with 6 and 74 deaths. There was no striking change in the number of filarial diseases in Europeans, but in Africans the comparative figures were:

	<i>O. volvulus</i>	<i>Loa loa</i>	<i>W. bancrofti</i>	<i>D. perstans</i>	<i>D. streptocerca</i>	<i>D. medinensis</i>	Others
1951 ...	3,168	1,467	422	892	—	7	3,790
1952 ...	1,402	1,543	638	949	10	78	4,387

Amoebic dysentery occurred in 688 Europeans and 11,534 Africans; 91 of the latter died.

There is a lengthy account of the scheme whereby skimmed milk powder was provided on a large scale in areas where kwashiorkor is prevalent [this *Bulletin*, 1954, v. 51, 91].

Six cases of *rabies* in Europeans and 40 in Africans are reported.

The remainder of the report contains the usual full account of special Government and non-Government medical and health services. As ever, the report is extremely interesting and informative.

H. J. O'D. Burke-Gaffney

EAST AFRICA HIGH COMMISSION. **Virus Research Institute Annual Report 1952** [HADDOW, A. J., Acting Director]. 29 pp., 1 map & 5 figs. on 2 pls. [15 refs.] 1953. Nairobi: High Commission Printer.

The Third Annual Report from the Virus Research Institute, Entebbe, again deals with work on a large number of different virus diseases. Nine isolations of poliomyelitis virus were made; monkeys were used for these isolations, for the more modern tissue culture methods have not yet been adopted. No success was obtained in attempts to adapt these strains to cotton rats or to bush-babies by the intra-spinal route. During 1952 a Cocksackie virus was isolated from one of the members of the staff, and it is believed to be the first virus of this group to be isolated in Uganda.

Work has, of course, continued with the yellow fever virus. During the year a European contracted yellow fever and died. Surveys of immunity to yellow fever in Africans have been confined this year to a sample collected from Southern and Central Karamoja; unfortunately the interpretation of the results is now bedevilled by the widespread use of yellow fever vaccination. A further set of sera was examined for the World Health Organization for their attempt to define the southern boundary of yellow fever. Two common South African mosquitoes, *Aedes (Stegomyia) strelitziae* and *Aedes (Stegomyia) demeilloni* were studied for their possible rôle in the transmission of yellow fever. Under laboratory conditions both were good vectors of the virus.

Some interesting studies have been made of the lesser bush-baby (*Galago senegalensis*). This animal is thought to be an important reservoir of the yellow fever virus in dry country. Unfortunately, with the standard protection test, 11-15 per cent. of the sera from these animals yielded equivocal results; attempts are now being made to increase the sensitivity of the test and so make it more suitable for antibody surveys in this species. In the laboratory it is easy to demonstrate that bush-babies are very sensitive to infection with yellow fever virus, and that the virus circulates in the blood for several days.

An attempt to show that the virus of Rift Valley Fever exists in a mild enzootic form among African cattle, sheep or wild ungulates was unsuccessful. A further attempt is being made to use the virus as a tool in laboratory studies of the interaction of virus and insect host.

Further evidence was collected by immunity tests that the Mengo virus is confined to 2 domestic species of rat, *Rattus rattus* and *Rattus coucha*, and is absent from many wild rodents.

The influenza virus makes a welcome appearance in the Institute for the first time this year, and a very sophisticated study is in progress.

The Report concludes with a brief account of work on *Aedes* eggs, and of an efficient technique for feeding *Aedes aegypti* on small laboratory animals.

Forrest Fulton

MOÇAMBIQUE. Missão de combate às tripanossomíases. Relatório anual de 1951. [DE ANDRADE SILVA, M.A.]. [**Annual Report for 1951 of the Trypanosomiasis Commission**] 75 pp., 2 figs., 2 folding charts & 1 folding coloured map. 1953. Lourenço Marques: Imprensa Nacional de Moçambique.

This report gives summarized accounts of the various sections of the local organization for the control of trypanosomiasis in Mozambique for the year 1951.

After a section on the administration side (staff, equipment and costs),

other subjects reported include brief notes on tsetse surveys, arranged in regions recording the occurrence of the following species, *Glossina morsitans*, *G. pallidipes*, *G. brevipalpis* and *G. austeni*.

In the account of human trypanosomiasis it is shown that there were 197 new cases including 1 European (128 in Niassa and 69 in Tete), the incidence being 0.6 per 1,000 examined. The quantities of drugs used in treatment were: antypol 1,450 gm., pentamidine 113.28 gm., tryparsamide 13,560 gm. and BAL 228 ampoules. The number of laboratory animals examined was 1,550.

The blood of 11,563 domestic animals was examined and 493 were found infected. *Trypanosoma vivax* and *T. congolense* were seen in 433 cattle, 56 goats and 1 sheep; *T. simiae* in 1 pig and *T. brucei* in 2 dogs. A list is given of 2,718 wild animals examined, 31 of which were infected with *T. vivax* and *T. congolense* either singly or mixed. Dimidium bromide was given to 36,662 domestic animals and again it was reported that the severity of the phenomenon of photosensitivity depended on the nutritional state of the animal. The campaign against *G. brevipalpis* in the Salamanga region continued to meet with success, the last fly of this species being taken in the area during May, 1951; as a result the fly rounds were discontinued after July.

Control of *G. morsitans* was the main responsibility of the 3 entomological subsections whose reports are given separately. These reports give, besides the numbers of flies caught in deflying houses and on fly rounds, the numbers and kinds of game animals destroyed and the amount of ammunition expended on this operation. At the end of the report a graph shows the monthly captures of *G. morsitans* on certain fly rounds for the years 1949, 1950 and 1951, and though there were periods when the numbers increased, the general trend over the 3 years was downwards; for the last 8 months of 1951 the chart shows fewer than 1,000 per month. Another graph shows the monthly captures of this fly in the deflying huts on certain roads during 1950 and 1951. Here again the general trend was downwards and in some months was actually nil. A map shows the area south of the mouth of the Sabi river where the hunting parties operate as part of the control organization.

[It is indeed a great convenience that much of the information contained in this report is condensed into tables. For the previous year's report, see this *Bulletin*, 1953, v. 50, 392.]

H. S. Leeson

- i. MOUNT, R. A. **Medical Mission to the Yemen, Southwest Arabia, 1951.**
I. Geomedical Observations. *Amer. J. Trop. Med. & Hyg.* 1953, Jan., v. 2, No. 1, 1-12, 1 fig. [18 refs.]
- ii. KUNTZ, R. E., MALAKATIS, G. M., LAWLESS, D. K. & STROME, C. P. A.
II. A Cursory Survey of the Intestinal Protozoa and Helminth Parasites in the People of the Yemen. *Ibid.*, 13-19, 1 fig.
- iii. MOUNT, R. A. & BARANSKI, J. R. **III. A Serological and Bacteriological Survey.** *Ibid.*, 20-29, 2 graphs. [18 refs.]

i. This report on the health of the people of the Yemen gives some details of the geography of the country, its climate, public health organization and medical facilities. There are no organized supplies of water, which is taken from open wells or streams. Sewage and refuse disposal is of the most primitive type.

The Ministry of Health is staffed by non-medical personnel without specialized training or experience in public health work. There is no official

census, and estimates of the population vary from 3 to 7 millions. The medical staff for the whole country consists of 4 trained and 4 partly trained doctors, no trained nurses and a number of untrained Yemini midwives. There are 3 hospitals, at Ta'izz, Hodeida and San'a which have a total capacity of 450 beds.

The diseases found to be prevalent in 3 of the 4 regions which comprise the Yemen were as follows: (a) malaria, the dysenteries, typhoid fever, schistosomiasis, intestinal parasites, venereal diseases, nutritional diseases, tuberculosis, and eye diseases are common in the lowlands; (b) malaria, the dysenteries, typhoid fever, schistosomiasis, venereal diseases, tuberculosis, typhus fever, and trachoma are the main diseases in the middle heights; (c) the same diseases occur in the highlands, but malaria, the dysenteries and schistosomiasis are less common there; (d) the diseases prevalent in the fourth region, the rolling tablelands of the East, are not given.

Among the arthropods collected by the expedition were 9 species of anopheline mosquitoes, 18 species of culicine mosquitoes, many muscid flies, various sandflies (*Phlebotomus*), 3 Ixodid ticks and 2 Argasid ticks. The 85 molluscs collected included *Biomphalaria boissyi arabica* (vector of *Schistosoma mansoni*) and *Bulinus contortus* (vector of *Schistosoma haematobium*).

[This survey appears to have been superficial and much of the information was obtained from the few doctors in the country.]

ii. This reports the results of a brief parasitological survey of samples of the population of 4 cities totalling about 100,000 persons. The survey is based on examination of single specimens of stool and urine and an anal swab from each of less than 500 individuals. The exact number of persons examined is not given but only percentages of the population infected with protozoa and helminths. *Entamoeba histolytica* infection was found in 33-65 per cent. *Ascaris*, *Enterobius*, *Trichuris*, *Hymenolepis*, and *Taenia saginata* were fairly common. No ankylostomiasis, *Wuchereria*, *Dracunculus*, or *Taenia solium* was encountered. *Schistosoma haematobium* infection was found in 2-10 per cent. of the population. A high rate of infection with *Schistosoma mansoni* (4-56 per cent.) is due, the authors believe, to the use of infected water for religious purposes in the ablution pools of mosques.

iii. This describes the results of a serological and bacteriological survey undertaken in the Yemen in 1951.

That brucellosis commonly occurs is shown by the number of positive results of agglutination tests for *Brucella melitensis* carried out on the serum of 260 persons residing in Ta'izz and San'a (3 per cent.). Kahn tests performed on 260 persons from the same cities proved positive in over 50 per cent. of all the age groups investigated.

A high endemicity of both murine and epidemic typhus is indicated by the results of Weil-Felix and complement-fixation tests performed on the sera of 265 persons dwelling in mountainous districts. Of these, positive agglutination reactions for *Proteus OXK* in specimens taken at Ta'izz suggest that mite-borne typhus may be encountered in that part of the country.

Bacillary dysentery and enteric fevers are both common, as shown by the 51 positive cultures of *Shigella* and 8 positive cultures of *Salmonella* organisms obtained from 358 single specimens of stools. Agglutination tests support the view that both typhoid and paratyphoid fevers are highly endemic.

W. R. M. Drew

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